## MODERN Nachine Shop





For fast, efficient rough grinding and fine finishing of carbides, stellite, high speed steel, and other modern tools, install Prosser Carbide Grinders. Their rugged construction, modern design and ease of operation insure long, dependable and profitable service.

Prosser Carbide Grinders are built in bench and floor models of several capacities, for wet or dry grinding. Attachments for chip breaker and drill grinding.

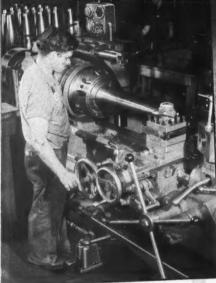
#### Important features include:

- · Quick-acting indexing tables.
- · Adequate wet-grinding equipment.
- High grade ball bearing spindles.
- Oversize wheels, giving longer wheel life, and permitting grinding of larger tools.
- · Moderate price.
- · Prompt deliveries.

Write for details

Thomas Prosser & Son

## HEAVY CYLINDRICAL PARTS CHUCKED



USING "ZOGAN"

- 1 Air Operated Collet Chuck
- 2 Rotating Air Cylinder
- Foot Operated Air
- 4 R-F-L Unit (air regu

LOGAN HYDRAULIC

MANDRELS



DESIGNED and BUILT FOR SPECIFIC APPLICATIONS

Logan also offers expanding mandrels for holding work not suited to external chucking. The long 6-

jaw mandrel illustrated provides rigidity and uniform support for long tubular parts of unusual weight or thin-walled section, thus permitting precision turning, grooving, facing, etc. The short 3-jaw mandrel holds relatively shallow work that cannot be chucked externally because of thin section or projections such as flanges, bosses and fillets. Send deteals of your problems for free analysis and recommendations.

LOGAN ENGINEERING HELP

Consult Logan engineers for advice on how to obtain higher accuracy and finish—reduce chucking time—and minimize operator fatigue with air and hydraulic operated chucks and mandrels. There is no obligation for this service.

Heavy, bulky 155 mm. shell casings are accurately centered and quickly chucked for finishing operations by means of a Logan air operated collet-type chuck and a complete Logan air system. Air power and the handy foot operated valve leave the operator's hands free, and save his time and energy for work requiring high manual skill.

This operation involves hand finishing of tool marks and other surface irregularities to meet close inspection for accuracy and finish. Constant parallel gripping contact is assured because the master jaws are positioned in the taper bore by compression springs—an exclusive Logan collet chuck feature. Loading, chucking and unloading of the unwieldy workpiece require only 45 sec.

A wide range of cylindrical work can be held on standard Logan air or hydraulic operated collet chucks, manufactured to fit American standard spindle nose specifications. Logan also offers a complete line of air and hydraulic operated chucks in these types:

- 1. 2 and 3-jaw universal and combination chucks.
- 2. Dual purpose 2-in-1 chucks.
- 3. 4-jaw duplex chucks.
- Compensating finger-type chucks.
- 5. Compensating jaw-type chucks.
- 6. Indexing jaw-type chucks.

and mandrels. There is no obligation for this service.

1110



Designed to do work that heretofore has necessitated considerable special engineering - and to do it quickly, accurately and easily - the Monarch Moldmaker's Toolroom Lathe is the latest addition to the Monarch line.

Briefly, this machine solves the problem of shrinkage in making molds for producing accurate threaded parts for the plastics, molded rubber goods, powdered metal and porcelain industries, where the threads in the mold must have a longer lead than those in the finished parts.

It eliminates the necessity of making special change gears for each different type of mold. A lead screw varying mechanism — an inherent part of the lathe - makes it possible for the regular quick change gear box to be used for all lead screw variations. Thus the machine can quickly be set from one job to another.

Twenty Timken Tapered Roller Bearings applied throughout the lathe - including the mounting of the main spindle - help to as-

sure the necessary precision, speed and endurance. You can have the bearing performance so long enjoyed by The Monarch Machine Tool Company by making sure that the trademark "TIMKEN" appears on every Bearing Company, Canton 6, Ohio. TAPERED ROLLER BEARINGS

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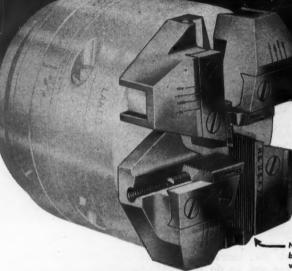
Logan

Ameri-

compes:

hucks.

#### INTERCHANGEABILITY OF LANDIS CHASERS LOWERS OPERATING COSTS



Note the full length chaser which has been inserted with three practically warn-out chasers to complete the set

#### 12 Features of the LANDIS TANGENTIAL CHASER

- 1-Permanent throat permits close to shoulder threading throughout life of chasers
- 2-Rake angle range covers all machin-able materials
- 3-Free cutting condition permits maximum cutting speeds
- 4-Simple grinding operation renews en-tire cutting edge and leading feature 8-Line centact with work lessens fric-tion and minimizes thread distortion
  - 8-Leading feature insures thread of accurate lead
  - accurate read
    7-Lateral absorption of cutting strain
    reduces vibration and chaser breakage 8-Right and lefthand threading feature
  - Hight and tetthand threath reduces chaser equipment
  - 9-Standard chasers thread all diameters with proper chaser holders 10-Interchangeability of chasers lowers operating cost
  - 11-Chaser length provides exceptionally long life and low tool cost 12-Permanent throat gives equal dis-tribution of cut

#### EACH LANDIS CHASER IS AN INDEPENDENT UNIT

Whenever a Landis chaser is worn or damaged it can be reground or replaced without affecting the remaining chasers of the set. Each chaser is entirely independent of the other. New ones are substituted as needed, as long as the pitch, thread form, and threat remain the same, thereby insuring low operating cost.

The Finest Throad Cutting Tool in Industry

CHIN€ COMPANY

WAYN€SBORO, PA., U.S.A.

THREADING MACHINERY-THREAD CUTTING DIE HEADS-COLLAPSIBLE TAPS

## "PUTTING ON THE BRAKES" FASTER PRODUCTION!

#### How two of these Heald Bore-Matics replaced 5 machines . . . improved production and cut costs

A manufacturer of railroad brake cylinders was falling behind in his production. He was using five vertical drills to machine the bores, plus an extra buffing operation to produce the fine finish required. Convinced that there must be a better method, the manufacturer brought his problem to Heald.

Today, by putting his brakes on just two Heald Bore-Martics, this same manufacturer is getting substantially increased production . . . with simultaneous boring of two cylinders on each machine. Accuracy and finish are better. Manpower and floor space require-

ments are lowered. And no buffing or other extra finishing is required.

In hundreds of cases like this one—in large plants and in small shops—Heald machines are paying for themselves many times over in faster production and finer precision. For it is engineering like this that can easily mean the difference between profit and loss on any production line—especially in these days when so many other factors may be beyond your control.

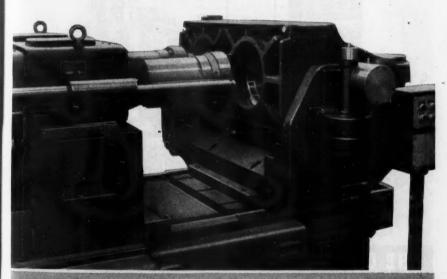
You may not be manufacturing brake cylinders, but if you require precision finishing, Heald has the equipment to

handle it regardless of the type or quantity required. For further information, write: THE HEALD MACHINE COM-PANY, Worcester 6, Mass.

#### HEALD

means finer precision

... lower costs

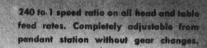


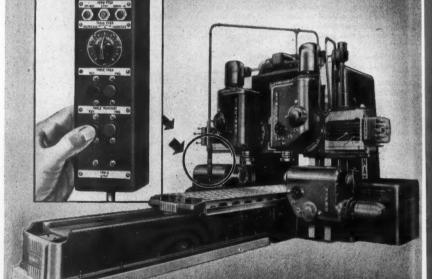
INTERNAL AND SURFACE GRINDING MACHINES . BORE-MATIC PRECISION FINISHING MACHINES

## 240 to 1 SPEED RATIO ...

Hypro-electronic

Planer Miller Drive





#### THE CINCINNATI HYPRO PLANER COMPANY

PLANERS - BORING MILLS - PLANER TYPE MILLERS
CINCINNATI, OHIO

May



## INTERNAL GEARS

n the swing mechanisms of power shovels and ladder trucks, in machine tools, and in numerous other applications, Farrel precision generated internal gears are giving efficient, long-life performance under severe operating conditions.

Their smooth, quiet operation is due to accuracy of tooth contour and tooth spacing inherent in the famous Farrel-Sykes method by which the teeth are generated.

You can get Farrel internal gears in any size up to 18-feet diameter, 12-inch face, 1¼ DP, precision generated with either spur or single helical teeth.

Internal gears frequently meet design and operating conditions better than other types and their availability in large sizes has extended their advantages to many applications where size limitations formerly prevented their use.

Next time you need internal gears, the facilities and experience of the Farrel organization in the design, manufacture and operation of gearing of all types are at your service.

#### FARREL-BIRMINGHAM COMPANY, INC.

344 VULCAN ST., BUFFALO 7, N.Y.

Plants: Ansonia, Derby and Stonington, Conn., Buffalo, N.Y. Sales Offices: Ansonia, Buffalo, New York, Pittsburgh, Akren, Los Angeles, Tulsa, Houston, Charlotte.

This Farrel precision generated internal spur gear has 108 teeth, 1½ DP, 4½" face, 72.225" ID. The pinion hes 13 teeth, 1½ DP, 5¼" face, 10.358" OD.

FB-311

Farrel-Birmingham





This modern, automatic feed surface grinder has ample work ability to meet the heavy production schedules of competitive manufacturing. Its smooth action and perfect control count today where exceptional accuracy, fine finish and high production are essential. Write for Bulletin.



ABRASIVE MACHINE TOOL CO. EAST PROVIDENCE 14, RHODE ISLAND

Dealers in Principal Cities



LYING DOWN ON THE JOB THREE CENTURIES AGO

It was really a grind to produce knives and tools in this 17th century shop. The comfort of the machine operator was of no consequence and production was a creaking, time-consuming process.

The Government Machine Tool Surplus Lists may include ABRASIVE Machines to replace your obsolete machinery. Send us the machine serial number for any desired information; we will endeavor to provide attachments, accessories and repair parts as required.



MODERN MACHINE SHOP

May, 1946

Yes, it's Spindle power verse m in neutr stop. T

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headsto

Look

Gisho

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# ONE FINGER is all it takes

## to start, stop, or reverse the spindle ... and this is a 50 h. p. headstock!

Yes, it's as easy as this with Gisholt's new Hydraulic Spindle Control. Just touch this handy lever...hydraulic power engages and disengages the forward and reverse multiple disc clutches. When the control lever is in neutral, pressure is directed to a contracting band-type brake which brings the spindle to a quick, smooth stop. Thus, headstock control is effortless—as easy as pushing buttons!

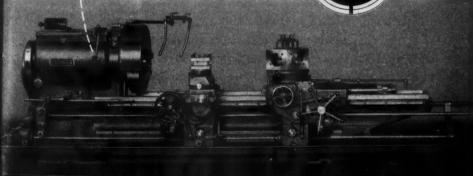
The Gisholt 51 Saddle Type Turret Lathe shown below is an extremely powerful machine with a 50 h.p. headstock. Yet.it requires surprisingly light operating

Look Ahead . . . Keep Ahead . . . with Gisholt Improvements in Metal Turning effort. Another outstanding example of Gisholt leadership in faster, lower cost machining, the Gisholt hydraulic spindle control is now available on all Gisholt Turret Lathes. Write for complete information.

#### GISHOLT MACHINE COMPANY

1219 East Washington Avenue . Madison 3, Wisconsin





TURRET LATHES . AUTOMATIC LATHES . SUPERFINISHERS . BALANCERS . SPECIAL MACHINES

CINCI NATI CINCINNATI The new CINCINNATI Plain Hydromatic Milling Machine (No. 5-60 size illustrated). Catalog M-1372 contains complete specifications and details of features for both the Plain and Duplex styles.

all the time-proved Hydromatic features, plus many new and exclusive advantages which make them especially useful for heavy cut and rapid metal removal on all types of metals, and using all type of cutters including sintered carbide. The new CINCINNATI Hydromatics are built in twelve sizes, in Plain and Dupler styles, ranging from 24" to 90" table travels, powered by 7½ to 30 h. p. motor (higher if desired), depending upon the size of the machine. Catalo No. M-1372 contains complete specifications and other important details. A carry of this informative book is ways for the painting.

# Introducing THE NEW CINCINNATION HYDROMATIC MILLING MACHINES



The new CINCINNATI Hydromatics are built in Duplex styles, too. This illustration shows the largest standard size, a No. 56-90, tooled up to mill the channels in cast steel journal boxes. Here is concrete evidence of the ruggedness and cutting capacity of these new machines. Both spindles are taking a cut 3/8" deep by 11", wide (the full diameter of the cutters).

THE CINCINNATI MILLING MACHINE CO

MELING MACHINES . BROACHING MACHINES . CUTTER SHAPPENING MACHINE



WHAT DO YOU
WANT IN A
MILLING MACHINE?

The exceptional adaptability of Knight Millers simplifies

production of unusual or difficult jobs that often require two or more special machines... Its tilting, swiveling table makes expensive special jigs, angle plates or other fixtures unnecessary for complicated milling, boring or shaping jobs...

this sixteen table and spindle feed changes, and four different vertical spindle feeds, provide for the use of a wide range of various size cutters... Its strong,

carefully engineered one-piece column casting, wide accurate bearings, precision gearing and rigid supports promise

accuracy, effortless operation and long service...

Its easy operating controls for direction,
speeds and feeds, properly located for

full vision and convenience, save time and boosts production.

Knight Millers combine <u>ALL</u> the benefits of versatility, accuracy, speed, simplicity and long service. Learn how they can help you increase output and lower costs.

Write for Catalog Today!

W.B.KNIGHT



MACHINERY COMPANY

MORE GOODS for MORE PEOPLE at LOWER COST

3920 WEST PINE BLVD. . ST. LOUIS B. MISSOURI

THE

616

May

# FOR INVOLUTE PROFILE CHECKING

No. 12M
Fellows
Involute
Measuring
Instrument
with automatic
Electrical
Recording

No Shop
Can Afford
to be
Without It

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This Fellows Involute Measuring Instrument pays for itself quickly in any shop making high precision gears. It detects errors before they cause costly rejects—and puts you in complete control of accuracy with less "fuss and flurry" than any other device for a similar purpose. Literature on request.

Fellows

THE FELLOWS GEAR SHAPER CO., Springfield, Vermont 616 Fisher Bldg., Detroit 2, or 1040 West Town Office Bldg., Chicago 12

NEW and IMPROVED 12" x 28"



MODERN MACHINE SHOP

May, 1946

May

#### UNIVERSAL and TOOL GRINDER



Keep your metalworking tools sharp with the new and improved Landis 12" x 28" Universal and Tool Grinder This modern grinding machine offers speedy, accurate grinding on a large variety of tool room work with standard equipment By means of additional attachments that are available, an exceptionally wide range of grinding jobs can be handled

Design improvements in this new model include. Universal headstock, spindle and face plate mounted on super-precision preloaded ball bearings, live and dead spindle, converted instantly, variable voltage drive, special protection for all bearing surfaces and working parts from grit and coolant for both wet and dry grinding.

Faster production on small grinding jobs is made possible with the Landis 12" x 28" Universal and Tool Grinder, through ease of setup, quick changeover from one setup to another plus the Universal features which include swiveling headstock and swiveling grinding wheel Surface tolerances can be held to instrument and aircraft accuracy through these exclusive vibration-reducingLandis features: ANNEALED CASTINGS, DYNAMICALLY BALANCED PARTS, WHEEL SPINDLE MOUNTED ON PRELOADED BALL BEARINGS

For further information on the most modern and complete Universal and Tool Grinding Machine offered to the trade, request Catalog K-45

CONDENSED OPERATING DATA

Max. Dist. Between Work Centers 28"
Max. Work Swing 123's"
Max. Work Dist, Full Size Wheel—12"
Work Speed rpm. 85 to 483
Traverse Speed Range per min. 12"—23"—43"—85"
Headstock—swivels each way 90°
Grinding Wheel
Head swivels each way 90°
Wheel Feed increment Range .0001"—001"



Precision Grinders

LANDIS TOOL COMPANY . WAYNESBORO, PENNA.

946



AT A PROFIT—with the Speed-Matic\*

Automatic electronic speed change, preselected for as many as ten stations. Complete range of spindle speeds—50 to 5000 RPM. Feeds from .0005" to .016" perrevolution. Colletchuck capacity 1/8".

You can define the Speed-Matic's specifications with those facts—but you can't describe its production capacity till you've seen it in operation. Finished parts roll off like peas shucked from a pod—and with unsurpassed accuracy. We think you'll call it The World's Fastest Hand Screw Machine.

In the Speed-Matic maximum high production is combined with extreme accuracy, on lots of 25 to 500 or higher. Power feed, ram-type turret is teamed with a spring-return, hand-operated, cut-off slide.

\* SPEED-MATIC—Add this new name to your metal-turning dictionary—you'll be hearing a lot of it wherever rising production costs are a factor. The Speed-Matic is Monarch's answer to this problem in the hand screw machine field. Get full details now—from your nearest Monarch representative—or write us direct.

The Monarch Machine Tool Co. Sidney, Ohio



MODERN MACHINE SHOP

May, 1946

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### FOSDICK HIGH SPEED DRILLS



Fairchild Cameras are precision instruments equiring exceptionally accurate machine work. Fosdick 6- and 4-spindle High Speed Prills are used extensively for drilling—reaming and counterboring various parts of these instruments.

The battery of 4-spindle High Speed Drills hown are drilling shutter housings for large 55 camera. These are but a few of the jobs tandled by Fosdick High Speed Drills in this blant. Cases—cones—lens—shutter housings—film magazine parts—all are handled by hese high speed drills for precision holes from

0.16 inch to 11/4 inch.

The tolerances maintained range from .002 inch for drilling—.0005 inch for reaming and .001 inch for counterboring.

This battery is only one of thousands of Fosdick High Speed Drills now operating in hundreds of plants producing precision work. Where they have been engaged in war production, they can and are being quickly converted to producing peace-time products.

For full particulars write for the Fosdick High Speed Drill Bulletin M.S.H.S.

**FOSDICK** 

MACHINE TOOL CO.



### you wouldn't

burden a horse with more

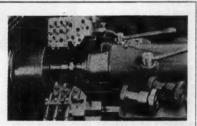
Nor should you put carbide cutting tools on a lathe lacking the fundamental rigidity for their most efficient use. Carbide cutting tools have increased harsepower requirements up to 300 per cent. They have increased cutting speeds 200 to 500 per cent.

Our jobs, our earnings and profits as well, will depend upon low cost production in the terrific competition to come. The most modern machines and methods must be used.

Now is the time to scrap the machines that cannot "carry the load," and replace them with good War Surplus machines or new machines. 'Phone now for one of our engineers to help you to select the equipment best suited to your needs.

#### What Horsepower Are YOU Using?

45 to 50 horsepower is required to rough turn and face these automobile transmission cluster gears, at the high surface speeds required by carbide cutting tools—this is approximately three times the horsepower needed with high speed steel cutting tools. Fay Automatic Lathes are designed for the most efficient use of carbide cutting tools.



Engineered to "Carry the Load" for Most Productive Operation With Carbide Cutting Tools



#### JONES & LAMSON

MACHINE COMPANY Springfield, Vermont, U.S.A. Manufacturer of: Universal Turner Lethes • Fay Automatic Lethes • Automatic Double-End Milling and Centering Machines • Automatic Thread Grinders • Optical Comparators • Automatic Opening Threading Dies and Chasers.

MODERN MACHINE SHOP

May, 1946

May





#### Jarvis Flexible Shaft Machines

When used with correctly selected Jarvis Rotary Tools, these multiple-speed flexible shaft machines are the "power hands" of the "metal working industry. They will perform many filing, grinding, sanding, buffing, brushing, cutting, and cleaning operations.

#### **Jarvis Ground Rotary Files**

The recognized standard in thousands of manufacturing plants for fast, efficient performance. Now furnished with Jarvis Hy-speed Case, increasing tool life an average of three times. Send your high-speed steel rotary files back to Jarvis for regrinding. They will be furnished with life prolonging Hy-speed Case.

Send for our new catalog MFTI

THE CHARLES L. JARVIS CO., MIDDLETOWN, CONN.

TAPPING ATTACHMENTS . FLEXIBLE SHAFT MACHINES . GROUND ROTARY FILES

### The Practical Automatic for Long, Medium &



Radically new shockless spindle indexing mechanism which insures holding closer accuracy.

Accelerated Geneva motion for more rapid spindle drum indexing.

Unusual tool clearance and chip area with automatic chip conveyor.

Micrometer Cross Slide Adjustment.

A range of 24 spindle speeds provided by 8 sets of pick-off gears—conveniently assembled, small and easy to handle.

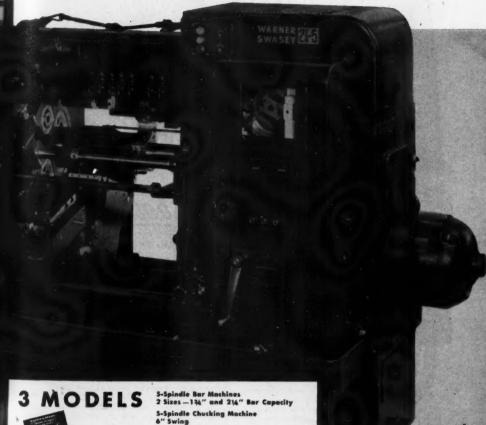
These are only a few of the innovations so timely in effecting higher speed, lower-cost production.

No tie-up of money in assorte stocks of cams • No cam storag space required • No in-and-ou recording and tracing "lost" cam

The cams that control tool strokes are perm nently assembled in a patented QUICK-SE mechanism that makes possible an infini number of settings, by quick, simple adjust ment on a graduated quadrant.

A NEW MULTIPLE SPINDLE

## 8 SHORT RUN PRODUCTION!





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-SE nfinit

djus

You should have full information on these new machine tools with their many cost-cutting features and design improvements.

Get in touch with your nearest Warner & Swasey Field Engineer for full particulars, or-send today for descriptive bulletins, just printed.

LATHES - MULTIPLE-SPINDLE AUTOMATICS - PRECISION TAPPING AND THREADING MACHINES

AUTOMATIC 64

You Can Machine It Better, Faster, for less .. With a Worner & Swasey

WARNER SWASEY

Machine Tools

Cleveland



**Drive hex-head self-tapping screws** with these new Apex *double-life* sockets and get three important savings:

1. The replaceable socket is tough, long-wearing, specially made for this service.

Each socket has two lives. Use one end till it's worn, then turn it end for end and you've got a brand new socket. 3. Once you have shanks for your portable drivers, simply replace the sockets when necessary, at a fraction of the usual cost. Shanks, available for practically all electric, pneumatic, and spiral drivers, last indefinitely. Sockets (for 1/4", 9/32", and 5/16" hex-head self-tapping screws) take minimum space, simplify inventory. Bulletin 16A gives prices and details. Write Dept.M for it today.

THE APEX MACHINE AND TOOL COMPANY, DAYTON, ONIO

SOCKETS

Safety Friction Tapping Chucks • Quick Change and Positive Drive Drill Chucks • Vertical Float Tapping Chucks • Parallel Floating Tool Holders • Power Bits for Phillips, Slotted Head and Clutch Head Screw Drivers • Hand Drivers for Phillips and Clutch Head Screws • Aircraft and Industrial Universal Joints • Sockets and Universal Joint Socket Wrenches.

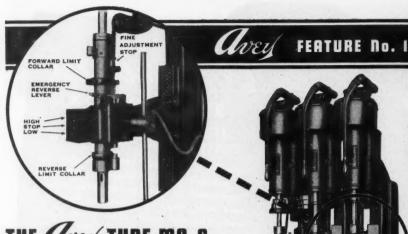
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#### 22 ALUMINOX FOR CENTERLESS AND CYLINDRICAL GRINDING

Whether it's grinding .140" alloy steel rod or massive rolls of steel or cast iron, "American" 22 Aluminox Grinding Wheels hold their shape, cut cool and fast . . . maintain top production from every machine. Available in all popular sizes up to 30". Let us know your requirements.

AMERICAN EMERY WHEEL WORKS

2 RICHMOND SQUARE, PROVIDENCE 1, R. 1.



THE **Cory** Type ma-6 Avey-matic power fed Hand feed and reversing motor tapping machine

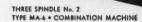
features

hand feed reversing motor for tapping

Dog control for depth — maintaining accuracy of depth within one-half revolution of the spindle — or emergency relief lever used to reverse motor if necessary before tapping cycle is completed. The natural motion of the spindle sleeve is used to control the reversing of the motor.

Type MA-6 is made in following capacities:
No. 2 — 1/8" capacity in cast iron.
No. 3 — 11/4" capacity in cast iron.

THE AVEY DRILLING MACHINE CO.



· 1st Spindle - Avey-matic Feed 2nd Spindle - Mand Feed







♠ The Seneca Falls Automatic Work Driver is a self-centering, quick-acting Driver designed to eliminate dogging time, thus permitting one operator to operate two or more machines. Its positive grip prevents slippage and resulting tool breakage. It provides greater safety for the operator since there are no projecting screws or sharp corners to catch clothing or injure hands. It can be used on any type of engine lathe, multiple tool lathe and on plain or universal grinders. Can also be used for certain work on turret lathes.

Now available in eighteen standardized models which can be ordered from our new catalog. Write for your copy today and utilize this proven Driver to help speed production.

SENECA FALLS MACHINE CO., SENECA FALLS, N. Y.

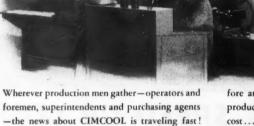
LATHE NEWS from SENECA FALLS

FALLS MACHINE CO., SENECA FALLS, N.

946



HAVENT YOU HEARD?
CIMCOOL COVERS
85% OF ALL METALWORKING JOBS!



Wherever production men gather—operators and foremen, superintendents and purchasing agents—the news about CIMCOOL is traveling fast! And why not? For they're learning on the production line that CIMCOOL combines high cooling capacity and high friction reduction to a degree never be

fore attained! Yes, CIMCOOL provides higher production efficiency at lower unit cutting fluid cost...and CIMCOOL offers these advantages

on 85% of all metal-working operations that require cutting fluids! The word is getting around in more and more plants and shops: SPECIFY CIMCOOL!

#### Check · Clip · Mail





CIM

M

#### FOR HIGHER PRODUCTION EFFICIENCY - FOR LOWER UNIT CUTTING FLUID COST

CIMCOOL helps increase production rates. Increased cooling capacity permits higher cutting speeds and feeds. Grinding wheels cut more freely. Low surface tension allows small chips and grit to settle out rapidly.



CIMCOOL is tops with operators. It restricts bacterial growth, does not contain animal or vegetable oils subject to rancidity, and is not a skin irritant. Smoke, objectionable adors and hot chips are eliminated.



CIMCOOL helps increase tool life. Chemical lubricity reduces tool wear. Tools are kept cool to touch. Increased wetting action permits greater penetration between tool and chip.



CIMCOOL is safest. Fire hazards are eliminated. Absence of slippery film on operator's hands, machine controls, work and floor reduces danger of accidents. Restriction of bacterial growth limits risk of infection.



CIMCOOL reduces downtime on machines. Fewer tool changes and fewer changes of cutting fluid are necessary. Pump and supply lines are kept clean. No spoilage.



CIMCOOL contains a rust inhibitor good for the life of the fluid for protection of machine and work. It contains no chromates or highly alkaline components which may be irritating to the skin.



CIMCOOL facilitates accuracy. Freer cutting reduces pressure. Uniform temperature is maintained on work and on machine. Dirt does not stick to work or gages, permitting faster, more accurate gaging.



CIMCOOL is applicable to 85% of all metal-working operations requiring cutting fluids. It replaces all water emulsions and all but very highly compounded specialty oils for selected jobs.





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plants

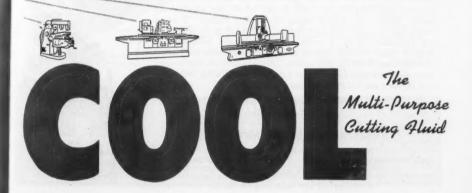
1946

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Gray Co., of Cincinnati, Ohio writes as follows about an operation of milling gear racks in SAE 1040 seel: "A few months ago we changed to CIMCOOL. As a result, we have saved about 100% cutter life... formerly in

sharpening, we ground back about .008 inch per tooth, and since using CIMCOOL, this has been reduced to approximately .003 inch. At the same time, we have more pieces per tool grind. Also, cutting action of this operation was void of tearing, resulting in an improved finish."

DIVISION OF THE CINCINNATI MILLING MACHINE COMPANY . Cincinnati 9, Ohio, U.S.A.





Steels just don't come too tough for MARVEL Giant Hydraulic Hack Saws. Take, for example, the three No. 18 MARVEL Saws, at the Babcock & Wilcox steel mill, shown above. These machines are used to cut test specimens for sample pieces of stainless and other tough alloy billets which are checked for seams, pipes, etc., before being drawn into tubing. It takes tough steel to make the best tubing, and it takes modern sawing equipment to cut it rapidly, accurately and economically. With 10 types of metal-cutting saws, each available in a series of variations, MARVEL can furnish sawing machines that exactly meet your requirements. If you have a metal-sawing problemcall in the local MARVEL Sawing Engineer.

> Write for MARVEL Catalog or check it in your Sweet's Catalog Files.

#### ARMSTRONG-BLUM MFG. CO.

"The Hack Saw People" **5700 BLOOMINGDALE AVENUE** CHICAGO 39, U. S. A.

Eastern Sales Office: 225 Lafayette St., New York 12, N. Y. Typical examples of formed whael contours dressed by the VINCO B-1 (angle tangent to radius) Dresser.

They Came

Gear Grinding Industry. To insure a dependable precision production program, this well known manufacturer needed a formed wheel dresser that could automatically dress the wheel so it would consistently grind a true involute profile.

So They Came to VINCO!

We designed and made a single purpose dresser that eliminating the processing of the profile.

We designed and made a single purpose dresser that eliminated any heel or toe action of the diamond post, was adjustable for either a rough or finish cut, and would dress a true radius with a speed and accuracy hitherto unobtainable by such a simplified method. Regardless of the experience of the operator the results obtained were more than satisfactory.

With a wheel dressing problem familiar to everyone in the

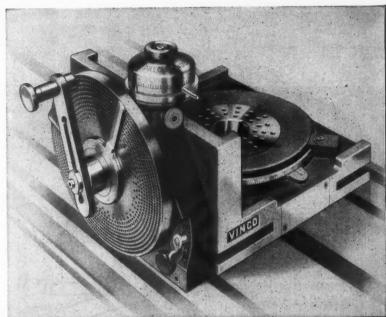
Check this type of development with relation to your own precision grinding problems. Full information will be furnished upon request.

#### MILLIONTHS OF AN INCH FOR SALE BY VINCO

VINCO FORPORATION. OF SCHLEFER HIGHWAY DETROIT 27 MICHIGAN SALES DEFICES NEW YORK, CHICAGO, CLEVELAND Semi-Automatic Hydraulic Spline and Gear Grinder

Angle Tangent to Radius Dresser • Index Plates • Precision Vises • Sine Bars • Straights-side Spline. Serration Spline. Involute Spline and Helical Spline Plug and Ring Gages • Thread Plugs, Rings and Setting Plug Gages • Spur and Helical Master Gears • Munition Gages • Propeller Shaft and Hub Gages • Built-up and Special Gages • Gear Relling Inspection Fixtures • Indexing Fixtures • Hydraulic Power Control Utilization and Distribution Utilization utilization under Utilizat

1946







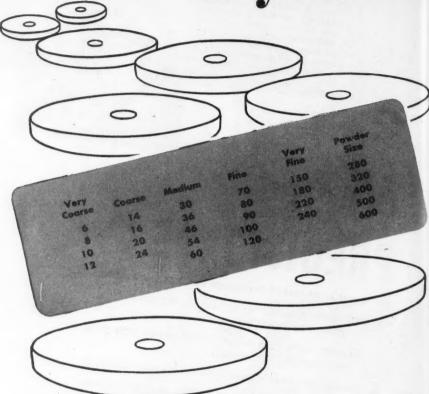
## VINCO PRECISIONDEX

- CIRCULAR DIVISIONS IN DEGREES, MINUTES AND SECONDS.
- INDEXING ACCURACY TO WITHIN 20 SEC. OF ARC. IDEAL FOR INSPECTION PURPOSES.
- FIXTURE CAN BE USED IN ANY ANGULAR POSITION FROM HORIZONTAL TO VERTICAL.
- SPINDLE MOUNTED IN VINCO PRECISION BALL BEARINGS.
- SPINDLE, FACE PLATE AND INNER BALL RACE ARE OF ONE-PIECE CONSTRUCTION.
- SPINDLE CAN BE CLAMPED FOR MILLING OR BORING.
- ROTATION-OF SPINDLE CONTROLLED TO ONE SECOND OF ARC.
- 111/2" WORK SWING.

For complete details ask for bulletin No. 55A.

VINCO CORP., DETROIT 27, MICHIGAN

## How do you tell



A good rule for good grinding... CALL



## which grit to use?



Listed is a commercial classification of standard abrasive grit sizes. They come in a wide range...

from 6 classified as very coarse to 600 classified as powder size. And, the variety is further extended by special sizes and combinations. Yet, each one is designed to do a specific job better than any of the rest.

To complicate correct choice even more, there is a long list of variable factors to consider. Among these, you'll find wheel speed, machine condition, specified tolerances, material analysis, related production schedules, and a host of others.

The correct selection hinges on the review which is given to all the controlling factors. Yet...grinding efficiency and economy depend on the right answer.

That's why The Carborundum Company has put together a practical program... a service now deemed essential by many concerns who have been successful in getting improved grinding in terms of better finishes, or at lower cost.

Your nearest contact to this service is a CARBORUNDUM representative You'll find him willing and helpful. Through a sound knowledge of abrasives and first-hand experience of their use and application in the many plants he contacts, he is able to make intelligent recommendations and suggestions. On the more uncommon problems, he can even call on our Abrasive Engineers who are more fully qualified to tackle the tough problems. And, sometimes, the answer comes from the modern laboratories at CARBORUNDUM-where scientists and technicians probe for new information on abrasives, practices and developments.

Here is a sound approach—not only to getting the right grit—but the right combination of grit, bond, grade, structure and all the other parts that make up a grinding wheel. Plus knowledge and experience invaluable in modern grinding methods and procedures. It's easy to use. It incurs no obligation. It makes sense. The Carborundum Company, Niagara Falls, New York.

#### IN CARBORUNDUM

TRADE MARK

#### BONDED ABRASIVES

#### WHEELS

Silicon Carbide Aluminum Oxide Diamond Cylinder Hones

Sticks, Stones & Rubs Specialties

#### COATED ABRASIVES

Paper, Cloth and Combination

Sheets, Rolls, Discs

#### ABRASIVE GRAINS

for

Polishing
Lapping
Pressure Blasting
Finishing

"Carborundum" is a registered trademark which indicates manufacture by The Carborundum Company

1, 1946

## 5 GRINDING JOBS with 1 MACHINE...

SHARPENING
CYLINDRICAL
INTERNAL
RADIUS
SURFACE

#### TOOL ROOM - MODEL SHOP - PRODUCTION

With a capacity ranging from 8" to 15" and variable spindle speeds from 3000 to 6000 R. P. M., the Rotorex affords a flexibility suitable for delicate precision grinding. Readily interchangeable attachments for single purpose jobs such as cylindrical, internal and radius grinding, makes the Rotorex Grinder a universal machine for all kinds of grinding and sharpening operations.

Write for catalogue and prices.

IMMEDIATE DELIVERY

DOUGLAS

GRINDER

MACHINERY CO., INC., TO BROADWAY, NEW YORK 7, N





1946

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## EMPIRE FLOATING TAP HOLDER joins the other Empire Products ACCEPTED BY GREENLEE BROTHERS & CO. AS PROPER TOOLING FOR THEIR AUTOMATICS

The top picture shows the Empire Tap Holder in working position in a Greenlee Automatic—the lower picture shows the Floating Reamer Holder (2) along with the Luers Cutting off Blade (3)—all bring greater operating efficiencies to users.

The Floating Tap Holder is so constructed as to permit tap to float freely whether going in or out, and will not freeze under tension caused by drag of tap. No bell mouths can occur.

8774 GRINNELL AVE.



PHOTOS COURTESY GREENLEE BROTHERS & CO.

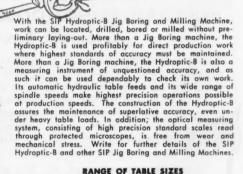
DETROIT 13, MICH.

LOCATING AND BORING
28 PRECISION HOLES
WITHIN 1 SEC. OF ARC ON THE

**GHYDRO** 

-no preliminary
-no jigs
laying out! -no jigs
laying or fixtures!

All 28 holes on the part shown at the right were bored at one setting on the SIP Hydroptic-B... without jigs and without preliminary laying out! The unique optical setting feature of the SIP Hydroptic-B Jig Boring and Milling Machine permits layout out in rectangular coordinates to within 0.0002" limits of accuracy of setting of table and spindle. And, with the circular dividing table, work dimensioned in polar coordinates can be located accurately to within one second of arcl



We also represent in the United States other world-famous Swiss High Precision Equipment: Andre Bechler — Maag Gear Wheel Co. — Mikron — Safag — Studer — Sallaz — Schaublin — Lienhard — Billeter.

HIGH PRECISION MACHINE TOOLS

No. 2C ... 18" x 103,"
No. 3K ... 211½" x 15"
No. 4G ... 27½" x 23",
No. 5G ... 43½" x 32"
Hydroptic-B ... 39½" x 32"

C O S A

AND MEASURING INSTRUMENTS

CHRYSLER BUILDING
New York 17. New York

YESTERDAY'S PIONEER . . . TODAY'S LEADER



and CHAMFERING TOOLS for Brown & Sharpe

Automatic Screw Machines

Rarely will it be necessary to purchase special cutoff and chamfering tools for use on Brown & Sharpe Automatic Screw Machines. Weldon now offers a large line of such tools which can be ordered from stock.

The tools in this new Weldon line cover a wide range of sizes to meet chamfering requirements to practically all diameters. A choice of two cutoff angles is offered—15° for steel or 23° for brass. Orders promptly filled through our local distributor or direct from factory stock.

WRITE FOR FOLDER No. 575 WITH LIST NUMBERS AND PRICES



36

### **Engineered Hole Location Service**

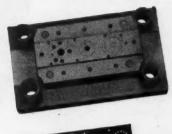
### Prolongs Die Life

Electrical lamination stampings are tough on dies. With thin abrasive stock to be cut in enormous quantities, absolute uniformity in the small punch and die clearances is a "must."

Here's how the Moore Jig Borer and Moore Jig Grinder team up to pay dividends in the toolroom and assure 25% to 100% added die life:

Both machines work to pre-engineered dimensions, enable all parts of the die to be made to figures instead of to "fit." Coordinate calculations, set up in the engineering department, can be used throughout in boring the soft pieces in the Moore Jig Borer and finish-grinding the hardened parts in the Moore Jig Grinder. And all parts of the die can be made concurrently by several toolmakers on an interchangeable parts-and-assembly basis instead of progressively as a one-man job.

Study the table below and consider how this Engineered Hole Location Service built around the Moore Jig Borer and Moore Jig Grinder can lower your tool costs...increase the capacity of the toolroom...speed new dies to your pressroom. Then ask a Moore sales engineer to stop by and answer your questions in detail.









### HOW MOORE JIG BORER AND MOORE JIG GRINDER PROMOTE INTERCHANGEABILITY IN THE TOOLROOM

- 1. Moore Jig Borer spots, drills, bores or reams all holes with minimum
- tool changes.

  2. Moore Jig Grinder relocates holes in hardened parts by finish-grinding.
- 3. Accurate Lead Screw Measuring Principle in both machines assures precise, rapid table settings within .0001" by coordinate location.
- Coordinate calculations made by engineering department are used throughout in boring and finish-grinding to figures instead of to "fit."
- Soft and hardened parts are made concurrently, not progressively. Errors in hardened parts are corrected, not retained and transferred to other parts.
- 6. Both machines inspect own work without disturbing set-up.



MOORE JIG BORER (TOUS) MOORE JIG GRINDER MOORE SPECIAL TOOL COMPANY, INC. 730 UNION AVENUE, BRIDGEPORT 7, CONN.

May, 1946

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MODERN MACHINE SHOP

27

## TIMES HAVE CHANGED --And So Has Metal Working Practice!

Modern metal working practice—the kind that pays substantial dividends and gets the work out on time—is not possible with worn or antique equipment of low productive capacity. "Bridgeport" Floor Grinders are definitely high production equipment.



No. 161 HIGH SPEED MOTORIZED GRINDER



No. 6AC HEAVY DUTY GRINDER

Outstanding features: power and rigidity to carry the grinding load with ease—maximum economy of floor space—better access for operator and work—fully stream-lined design for greater safety and improved appearance. Such refinements and scores of minor but important ones, go to make equipment that easily meets the complex needs of today.

THE BRIDGEPORT SAFETY EMERY WHEEL CO., INC., BRIDGEPORT, CONN., U. S. A.

### **Bridgeport**

GRINDERS . GRINDING WHEELS . BUFFING LATHES



## LATTEN YOUR COSTS

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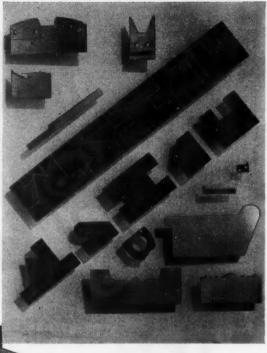
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ON SMALL TOOLS AND PARTS



### ... MAKE YOUR OWN

with SIMONDS Flat Ground Stock

Save the time and money now wasted in grinding ordinary mill stock to size. Standardize on ready-to-size Simonds "Red Streak" Flat Ground Stock for making your own punches, dies, gages, jigs, fixtures, templates, stamps, shims, machine parts and other small items.

"Red Streak" Oil Hardening Flat Ground is made from alloy tool steel poured in Simonds Stock Mills. It's cut to 18" length...accurately ground to standard thicknesses within limits of plus or minus .001"... is squared on both edges and ends... and has smooth surfaces for accurate layout work. What's more, it's uniformly annealed for easy machining and proper hardening. And each piece is packed in its own protective envelope, plainly marked with size and heat-treating instructions. 121 sizes available.

Order from your Industrial Supply Distributor, or from the nearest Simonds office, listed below, at the left.

BRANCE SFFICES: 1350 Columbia Road, Boston 27, Mass. 127 S. Green St., Chicago 7, Ill.; 416 W. Eighth St., Los Angeles 14, Calif.; 228 First St., San Francisco 5, Cal.; 311 S. W. Fiyet Ave., Freedand 4, Ore.; 31 Feedbry, 295 St. Remi St., Monstrell 30, Oree. SIMONDS SAW AND STEEL CO

PITCHBURG, MASS.



Yes, you'll thread perfectly with BATH TAPS if you take proper care of them.

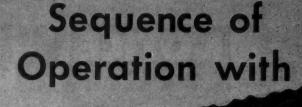
Lubricate them well. Run them fast. Watch alignment. Keep them sharp. Don't force them. Don't allow flutes to clog. Don't use a worn-out holder.

BATH TAPS are precision ground from the solid after hardening to assure you accuracy and long life. Use them properly to get the most out of them.

John Bath & Company. Inc.



Rough Casting.



Surface Broaching

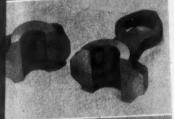
Frequently surface broaching may be employed to perform a number of machining operations on one part, thus reducing cost to a point where a profit is assured. We will be glad to figure with you on the possibility of using Footburt Surface Broaching Machines in solving your machining problems. Just send

THE FOOTE-BURT COMPANY, Cleveland 8, Ohio
Detroit Office, General Motors Building

blueprints and hourly production required.



Sides Surface Broached.

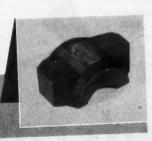


d and Cap Split, by Surface Broaching.



Sides of Rad Surfaced Broached.

Bottom and Sides of Cap, Surfaced Broached.





Footburt Patented Tooth Form

FOOTBURT Surface Broaching

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Automotive Industr

welds complete steel do in one whack.

Refrigeration Manufacture

weld steel cabinets times faster than methods.

Radio and Instrument Makers

weld three parts of tube at once . . . 2,500 per hour.



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Federal

and Acord Co., Chypeland - SPECIAL HIGH PRECISION MACHIN

MACHINE

# Federal

### **AUTOMATIC WELDING**

It is significant that metal fabricating industries noted for producing the most goods at lowest unit cost are the largest users of automatic resistance welding...also that Federal welders fill the "lion's share" of such applications.

Nowhere are production costs more critically scrutinized than in the automotive industry—which uses and continues to order more Federal Resistance Welders than any other group. One reason is the sort of production illustrated at left. Two full-doorsize stampings are welded into permanent union in a single pass through one of the latest machines developed by Federal in collaboration with designers of the door itself. Refrigeration, radio and instrument makers follow this lead for the same reason—that fabricating costs are cut by Federal.



practical reasons why the big timers, and others as well, turn more and more to fabrication with Federal Resistance Welding. It pays to do this before your product design is completed.

Get a copy of Federal Bulletin SP 346, which briefly describes each of the basic welder types. Then let a Federal Engineer prove to you that the best produc-

tion welding is by

GET THIS BULLETIN

describing all of the basic types of Federal Resistance Welders. Federal

Not all of these applications call for special machines. There is a wide variety of basic types in the

Federal welder line. Infinite variations of each are available with simple adaptations. Whatever YOU make in metal, it makes sense for you to study the

AND WELDER COMPANY

18 DANA STREET . WARREN, OHIO

1946

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## BUHR Specialized DRILL HEADS

MORE PRODUCTION

MORE PROFITS!

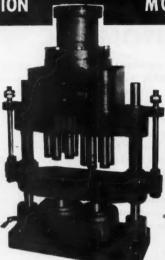
Proper tooling up means

More Production.

MULTIPLE

SPINDLE

DRILLING



Built by Buhr means Greater Profits. HOW

REAMING

BORING

TAPPING

### DESIGNED BY BUHR BUILT BY BUHR

This typical retooling job built to solve a mass production problem includes:

- 1—12 Spindle Head (6 for drilling and 6 for reaming) 1/8" holes. Spindles have in and out adjustments for drill wear.
- 1-Bushing Plate.
- 1-2 place Holding Fixture.

### NO DOWN

All Buhr Gears are shaved and Induction hardened for quieter, frictionless operation, lower power consumption and more production without "Down Time."

Write us about your Problems or Send blue prints to us . . . We will give you the comment.

BUHR Machine Tool Co.

845 GREEN ST.

ANN ARBOR, MICH.

HOW THE "WORLD'S GREATEST TOOLMAKERS"

CHECK EVERY

ARRETT HACKSAW AN



SAW



# To Insure Greater Uniformity and Superior Cutting Performance



Every Starrett hacksaw and band saw must pass a dozen different tests before it is rated worthy of the Starrett name and reputation. The precision gaging tests shown at the left (checking tooth set and spot testing for uniform hardness) are only two of many between selection of the steel stock and final inspection before packaging in the familiar Starrett red boxes. Once you select the right blade or saw for your jobs from the complete Starrett line, you know that you can expect the same fast-cutting, long-lasting performance with each re-order. Be sure to specify Starrett hacksaws and band saws when ordering from your mill supply distributor.

THE L. S. STARRETT CO. . ATHOL, . MASSACHUSETTS . U. S. A.

World's Greatest Toolmakers

### STARRETT

PRECISION TOOLS + DIAL INDICATORS + STEEL TAPES + HACKSAWS
METAL AND WOOD CUTTING BAND SAWS + GROUND PLAT STOCK

STARRE A K S A W

### **Getting Better Every Year**



Heavy Duty Bench Grinder

Heavy Duty Floor Grinder



Since 1896 machine tool manufacturers have made outstanding advancements in methods of manufacture.

During this period Hisey-Wolf has not only kept abreast of the trend, but in many instances has pioneered developments in the manufacture of grinders and buffers.

In the years ahead "Hisey" engineers will continue to give you the benefit of their experience and skill.

You will find a "Hisey" which will fit perfectly your grinding, buffing, or polishing needs.

Write for Catalog 70-Q.



Heavy Duty Drill Grinder



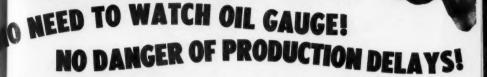
Heavy Duty Tex-Drive Snagging Grinder



Hisey

1896 × 1946

THE HISEY-WOLF MACHINE CO. CINCINNATI, OHIO "Sorry, but we won't meet delivery, because our shaper burned out a bearing, and it will take a week to make repairs ..."



Safety Device of

with "LUBRIGARD"

### **Multi-Purpose SHAPERS**

The function of "LUBRIGARD" is to automatically prevent the ram of the shaper from being started:

- (1) In case oil supply in reservoir is insufficient;
- (2) Should pressure in the system be below the minimum required; (3) Should a leak or failure of the oil pressure system occur; (4) Should the filter become clogged; (5) Should the drive pulley ros tation be incorrect.

In addition, "LUBRIGARD" will prevent the clutch control lever from being engaged while the drive pulley is at rest. Therefore, should the motor be started, the ram will not move unexpectedly. This prevents injury to the operator, or damage to the machine or work piece.

"LUBRIGARD" assures long, satisfactory shaper performance, because of adequate, automaticallycontrolled lubrication of all bearing surfaces. It increases the Precision Life!

Write Today for Bulletin GC-125

ENERAL ENGINEERING & MFG. CO., ST. LOUIS 4, MO.

Oil under pressure forces piston down, permitting projection on

GENCO

clutch control lever shaft to clear recess in piston, thereby allowing control lever to move into starting position.

1946

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MANUFACTURERS OF PRECISION MACHINERY SINCE 1917



ALLIED PRODUCTS CORPORATION

DEPARTMENT 5-A 4624 LAWTON AVENUE DETROIT 8, MICHIGAN

SPECIAL COLD FORGED PARTS • STANDARD CAP SCREWS • HARDENED AND PRECISION GROUND PARTS • SHEET METAL DIES FROM THE LARGEST TO THE SMALLEST • JIGS • FIXTURES • STEAM-HEATED PLASTIC MOLDS • SPECIAL

PRODUCTION TOOLS . R-B INTERCHANGEABLE PUNCHES AND DIES . DIE MAKERS' SUPPLIES

48

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## hese PLUS VALUES mean nore output per man hour

Swing over carriage 8"... over bed 16" - back carriage travel 5"... distance between centers 30"

- distance between centers 30
- I. Super-power for heavier cuts
- 2. Super-speed for faster cuts
- 3. Super-smoothness for finer cuts
- 4. Super-rigidity for truer cuts
- 5. Completely automatic cycles for easier cuts

### LIPE Carbo-Matic LATHE

ill your second-quarter production w?...your third-quarter labor costs be? There's a way out—greater output man hour and week. The Lipe Carboic Lathe will help you get it.

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proven

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y, 1946

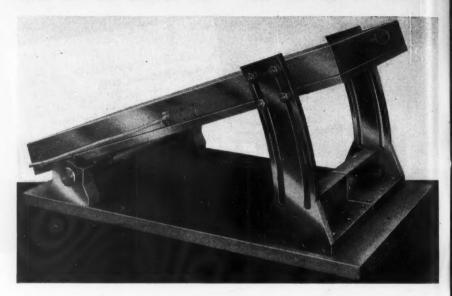
per-powered for heavier cuts, it has a wide tion of speeds in the range best suited to cartools. Deflection and weaving are eliminated bed and headstock cast in one piece, and by ssive tailstock adequate to hold high-speed rs without vibration. Heavy bed sidewalls einforced by cross ribs spaced for maximum strength and high resistance to torsional stresses and strains. Chatter, tool wear and breakage are sharply reduced by the smooth-flowing power of a fully-enveloped cone-and-worm gear drive.

Completely automatic with a smooth flexibility of control that affords a larger number of set-up combinations for a greater variety of work, the Lipe Carbo-Matic holds operator motions to a minimum. There is a positive stop for all feeds, a time delay for "dwell", and a micrometer adjustment for depth of cut on all tool carriages. All contributing to more output per man and machine hour.

WRITE OR WIRE FOR PRICES AND DELIVERY DATES

Lipe-ROLLWAY CORPORATION
SYRACUSE 1, NEW YORK

## WALKER CHUCKS



WALKER'S appreciate their obligation to the Metal Industry in solving and anticipating customer requirements.

WALKER engineers with over a half century of background and experience are qualified to offer solutions to magnetic problems.

WALKER chucks are universally used throughout the world.

WALKER engineers are constantly developing new magnetic chuck applications.

Walker invites you to submit your problems for their solution at no obligation.

-Walker Chucks

O. S. WALKER COMPANY

INCORPORATED

MAGNETIC CHUCKS . GRINDING MACHINES

MAGNETIC CHUCKS • GRINDING MACHINES
WORCESTER 6, MASSACHUSETTS



## 40% REDUCTION IN COST

THIS manufacturer of industrial trucks, a user of air tools, had to remodel his chassis fabricating department and required additional grinders. The Rotor Application Engineer was called in for suggestions. He saw that an additional air compressor would be required and suggested the installation of less expensive high cycle equipment. The equipment was purchased. Results:

Grinding cost was cut 40% because of increased output due to higher sustained speed under load

of high cycle grinders. Additional advantages: Lower first cost. The cost of the frequency converter was \$2,000.00 less than that of the corresponding air compressor or a saving of 76%.

Lower power cost for operating the high cycle tools (only ¼ that of the corresponding air tools).

Air or high cycle—the Rotor Application Engineer recommends whichever best suits your problems. Call him in for an unbiased analysis to give you lower costs.

Yours for faster grinding.

HIGH CYCLE O'TOOL

AIR

ROTOR TOOL

CYCL

CLEVELAND OHIO

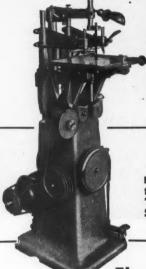
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# OLIVER ALL PURPOSE DIE MAKERS For Sawing · Filing · Tapping



Tried and proven, the Oliver of Adrian Die Making Machine actually saves 50% to 60% on direct labor costs... A perfect machine for sawing, filing and lapping irregular shapes from flat metal... An accurate machine for making expensive dies, gages, cams, templates and stripper plates... Every shop should have two or more machines.

#### The ACE HEAVY DUTY

LEFT—Heavy Duty . . . Saws, files, laps tool steel up to 3" thick. Permits sawing to center of 20" circle. Table 14" sq. tilts 15° to right, left and front . . . Stokes 0" to 5" with speeds from 100 to 300.

### The ACE BENCH TYPE

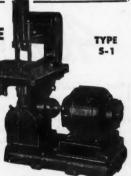
RIGHT—Saws, files, laps tool steel up to 1" thick . . . Saws to center of 17" circle. 10" sq. table tilts 10° right, left and forward.

Don't Neglect
Your Toolroom
It's the Backbone
of Production!

Write for literature

### OLIVER INSTRUMENT COMPANY

1430 E. MAUMEE ST. ADRIAN, MICH.



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AUTOMATIC DRILL GRINDERS - TOOL AND CUTTER GRINDERS - DRILL POINT THINNERS - TEMPLATE FOOL GRINDERS - FACE MILE GRINDERS - DIEMAKING MACHINES

### PORTER-CABLE Wet-Belt SURFACER

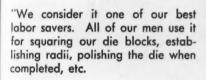
. . recommend it to any Tool or Die Shop ... IN JUNION WICE-President,
E. L. Danielson, Vice-President,
E. L. Tool Die the PORTERService Tool of the Surfacer,
Chicago, Says wet Belt Surfacer,
CABLE at right.

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"What we did by milling, hand-filing, and scraping, we now do on the PORTER-CABLE G-8 and save hours of labor.

"The machine has paid for itself over and over . . . "

Performs Many Operations Freehand! 5 TO 25 TIMES FASTER!

Send for the Porter-Cable Film "MACHINE OF THE AGE"

Shows application and operation of Wet-Belt Surfacers. Loaned FREE for foremen's meetings. Requests welcomed.



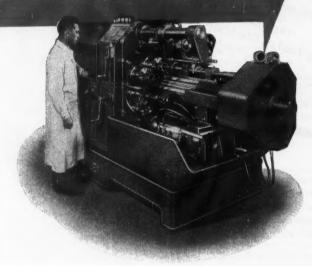
### Ask for Literature Now!

New folder just issued on many different applications of Abrasive Belt Surfacing



300-5 Wolf St., Syracuse, N. Y.

## LEADERSHIP PROVED BY HUNDREDS OF CASE HISTORIES



Our "case history" files illustrate the fact that the speed, accuracy and versatility of the New Britain Multiple Spindle Automatics provide the right combination for countless machining operations. Some are jobs which could not be performed in one operation on any machines except New Britains. Others illustrate high-speed, accurate machining of extremely hard metals requiring deep

cuts. Others are perfectly simple pieces
...remarkable because of the economies made possible by switching from
single spindle machines to New Britains.

New Britain engineers stand ready to show you how the profit possibilities of New Britain Automatic Screw and Chucking Machines can be applied to your product... Write us about your machining problems.

## NEW BRITAIN AUTOMATICS

THE NEW BRITAIN MACHINE COMPANY
NEW BRITAIN, CONNECTICUT
New Britain-Gridley Machine Division

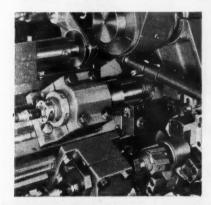
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### . HERE'S ANOTHER

Houdaille Malleable Iron Shock Absorber Housing

The inside surface of this shock absorber housing must be within a specified tolerance of .002" at all points. This requires not only preservation of accurate diameter, but absolute squareness of the end surface with the cylinder . . . The remarkable feature of the operation is that Houdaille\* turns this part out in 29 seconds, from rough casting to finished piece on a battery of New Britain Model 675 Multiple Spindle Automatic Chucking Machines . . . with no finish grinding required. The production of 122 pieces per machine per hour, day-in-day-out is an ideal instance of how the speed and accuracy of New Britains combine to give you the utmost in production and low cost per piece.

\* Pronounced - Hoo-dye



#### FRONT VIEW

Entirely open end construction provides accessibility for simplified chucking, cutting too 'and attachment setup.



#### REAR VIEW

Wide open end construction provides extra large chip space... accessibility from three sides and from above that permits excellent visibility and easy tool adjustment.

New Britain builds a complete line of Multiple Spindle Automatic Chucking Machines . . . four, six and eight spindles up to 12" capacity. . . Also a complete line of Multiple Spindle Automatic Screw Machines to 24" capacity.

1946



TATING CYLINDERS, either air or hydraulic, deliver fast, smooth, dependable power. They are available in a variety of mountings and with any length of stroke to meet your individual requirements. Extra strong cylinder walls (9/16" thick); no tie rods; makes servicing easy-either end of cylinder quickly removable.

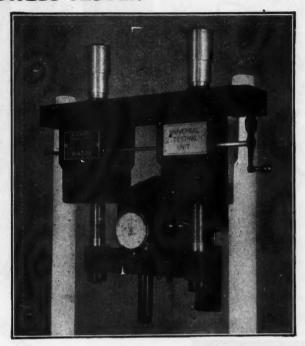
OTHER ANKER-HOLTH PRODUCTS—Air or Hydraulic 3- and 2-jaw Chucks, Collets, Arbors, Drill Press Chuck and Cylinder Combinations, 2- and 3-Jaw Finger and Compensating Chucks, Regulating Valve and Lubricator Assemblies, 3 or 4-Way Air Valves (hand or foot operated), Pressure Regulating Valves. Also Hydraulic Supercharged Power Units.

Anker-HOLTH MFG. CO. 2731 Connors St., Port Huron, Mich. Representatives in all Principal Cities

When buying new lathes, specify "AIRGRIP" Chucks and Cylinders

Lathe.

## "ROCKWELL" HARDNESS TESTER



NOW there is a way with our new Universal Testing Unit, that you may use "ROCKWELL" and "ROCKWELL Superficial" Hardness Testers on the largest or heaviest pieces you desire to test. You build your supporting frame. The U.T.U. comprises moving and all testing mechanism. Ghost pillars shown are merely our standardizing frame.

Discuss the possibility of this new facility, for whatever problems you have, with your own organization, then tell us if you would like to have one of our field engineers study the matter with you.



An Associate Company of American Chain & Cable WILSON

MECHANICAL INSTRUMENT CO., INC

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**Heavy Duty Drills** 

1344 Drills For Bruss

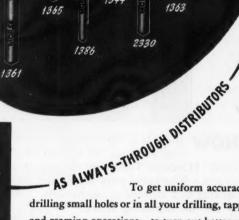
1361 "Bakelite" Drills

1386 Cotter Pin Brills

2330 Cobalt Drills

1363 "Quick Twist" Drills

367 Single Groove Drills



1344



To get uniform accuracy in drilling small holes or in all your drilling, tapping and reaming operations - to turn out better work faster, every day-always specify Morse Tools.

Styles shown above carried in stock.

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NEW YORK STORE. 130 LAFAYETTE ST. . CHICAGO STORE 570 WEST RANDOLPH ST. . SAN FRANCISCO STORE: 1180 FOLSOM ST









easkins The Flexible Shaft Machine occupies a unique place in Industry.

HC-5

1/2 H. P. Multi-speed

countershaft unit. 900 to 3600 RPM.

Bench-height ped-estal, 360° motor

It is perhaps the most versatile tool in the modern shop. Grinding-Drum and disc sanding-Rotary filing-Wire brushing-Buffing-Polishing-many other operations-all done with one Haskins Portable Flexible Shaft Machine. And done better, tooand faster—with less effort on the part of the operator. The result a savings to you of both man power and machine hours. Send for

details.



May, 1946

MODERN MACHINE SHOP

59

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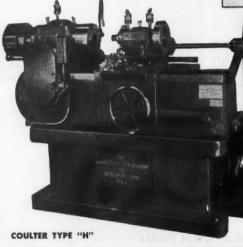
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### S A V I N G MINUTES

WHEN MINUTES COUNT

WITH A
COULTER
HOB THREAD
MILLER





ACCURATE HOB THREAD-ING is done with Precision and Speed on this RIGID . . . SIMPLE . . . Fully motorized COULTER Machine.

Unlimited capabilities for either right or left-hand threads—Internal or external.

All parts held in ordinary chucks, air operated chucks, air operated collet chucks, or special face plate fixtures can be threaded.

Write today for full information. Save time . . . and do a better job faster.

The James COULTER Machine Co.
BRIDGEPORT . CONNECTICUT . U.S.A.



THE CORRECT POWER

## for every job

The Lempco Pressurematic Press enables you to choose the correct pressure needed for press fitting, assembling, bending, straightening or die try-outs.

These versatile presses are of strong construction which assures an extra margin of safety far in excess of their limits. Movable head permits ram to be quickly centered over work. Bolster can be adjusted to accommodate

large or small jobs. Build up from zero to 60 tons pressure in 4 seconds.

For full details on this sturdy, powerful press, write for fully illustrated catalog.

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### exclusive!

Automatic Pressure Control is an exclusive feature of the Pressurematic and an ideal fixture for a production line. This device can be set so that the electrical circuit is broken at any pre-selected pressure. It can also be set to withdraw from and return to the work in manner similar to a punch press.

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## SHELDON

S-56 LATHE

1114" swing, 1" collet capacity, 35" between centers. Complete with 4speed V-Belt Underneath Drive and Motor.

Also available with center distance of 24" and 48" (48" on pedestal base).

### Have you seen the new Sheldon Lathes?

. . . those built in the new SHELDON machine tool plant? Always good lathes. these new SHELDONS are even better. not only in design refinements but in extreme accuracy, greater work capacity for size, "sweeter" handling and actual beauty of finish. Only a set-up like the new SHELDON plant could build such lathes—a specially designed building, the most modern manufacturing methods, complete tooling with row on row of the finest, most modern manufacturing equipment.

Make it a point to stop in at your SHELDON dealer and see these new machine tools. Note their moderate



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#### SPECIFICATIONS

Maximum distance, wheel to table	12 inches
1 Wheel	8xl or 8x½x¾ inches
Table Regular Working Surface	24x6 inches
Knee Bearing on Column	6 in. wide, 11½ in. long
Spindle Speeds	2600 and 3500 R.P.M.
Motor, 3/4 h.p. Ball Bearing Type	1725 R.P.M.
Weight, complete crated	850 lbs.

Let us send Bulletin giving full details





- tolerances as close as .0002".
- Wide range of spindle and reciprocating speeds permits honing small or large diameters.
  - 5 Oversize capacity gears and bearings permit continuous operation under heaviest loads.
  - Simple to operate. Inexperienced operators can obtain precision results.
- Patented Fulmer Control System places all controls at "floor level", in front of machine, within easy reach of operator.
- Patented Fulmer "Stop and Dwell" system permits honing up to internal shoulders or to the head end of blind cylinders.
- Exclusive Fulmer Sump System collects over 90% of the sludge.
- Uses any make of conventional honing heads.

#### C. ALLEN FULMER COMPANY

1233 First National Bank Bldg., Cincinnati, Ohio

HONING MACHINES PISTON RING LAPPERS CENTRIFUGAL CASTING MACHINES

DEALERS: A few attractive territories remain open. Write today!

Where 500 pieces per grind is really

Something A STRIBLE

application

Conditions:

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Depth of sut - - 3 32"
Feed per revolution - 0.016
Cutting speed - 250 feet per minute.

Turning, facing and chamfering a cast iron sleeve with Firthite sintered carbide tools on this job just meant about five times as many pieces per grind. Better production, less downtime, uniformly better products and a big reduction in grinding costs were the results.

If you have a cutting problem:



Firth-Sterling
STEEL COMPANY

McKEESPORT, PA. • PARSEGRE HARTFORD • PHILADELPHIA • DETROIT

## Enduring Accuracy...



Sub-Headstock for cutting Long Leads.

Whether a machine tool will remain precise for years is determined primarily by its manufacturer. Hendey Tool Room Lathes

are designed to be precise—carefully built to remain precise. Hendey Tool Room Lathes will produce accurately for years. The lathe bed is a close-grain alloy casting that is highly resistant to wear. The standard commercial lead screw is accurate to ±.001" per foot of lead. The carriage is scientifically designed to rigidly support maximum tool stresses. The carriage ways are lubricated automatically. Plus these advantages, the Hendey Tool Room Lathe is a fast producer. The geared headstock has 18 speeds—a Lo-Range of 10-652 r.p.m., a Hi-Range of 19-1000 r.p.m. The controls are simple and conveniently located for operator comfort.

If you want faster, more accurate production in the years to come, it will pay you to send for the Hendey Catalog.

The Hendey Machine Company



Main Office and Plant - Torrington, Connecticut

Branch Offices - New York, Chicago, Boston, Detroit, and Rochester Representatives in - Phila.. Cleveland, Los Angeles, Pittsburgh, San Francisco



TOOL ROOM LATHES 12"-14"-16"-18"-20"-24



CENTRALIZING PLUNGERS

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Francisco

y, 1946



DIAMETER EXTENSION

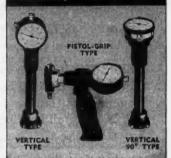
Positioning method used in all types and sizes of STANDARD Dial Bore Gages. Centralizing plungers work together; keep line of measurement through center of bore at all times, whether gage is inserted at angle or not. Just insert the gage, rock it, and take the reading.

ACCURATE

Repeats consistently within 20 millionths of an inch.

**PROVEN** 

Widely preferred among men who know precision work.



Special lengths available for long bores or jobs in which space in front of bore opening is

Indicator graduations may be selected from the following: .001", .0005", .0001", .00005", .01 mm, .005 mm, .002 mm, .001 mm.

WRITE FOR CATALOGUE A

STANDARD GAGE CO., Inc., Poughkeepsie, N.Y.

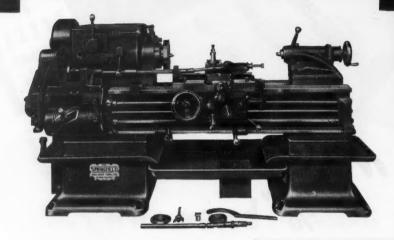
May, 1946

limited.

MODERN MACHINE SHOP

67

### PRECISION and LONG LIFE



SPRINGFIELD Precision LATHES fill the demands for tool room and production work by providing (1) extreme accuracy and (2) maintenance of this accuracy and long life.

Here are some of the factors that account for the sustaining of the original accuracy built into each Springfield Lathe:

HEADSTOCK...12 speeds...only half of the easy-shifting spur gears mesh at one time. APRON...extra heavy... operates on ball and bronze bearings throughout. TAIL-STOCK...all bearings and bed ways oiled from one well.

The SPRINGFIELD LATHE is an outstanding value for both tool room and quantity production use. Write for Bulletin 162.

### THE SPRINGFIELD MACHINE TOOL CO.

SPRINGFIELD

OHIO

# New Acme-Gridley CHUCK-MATIC

SINGLE SPINDLE 12" CHUCKER



Radically different from any other single spindle machine

For heavy-duty, high-production work on castings, forgings and tubing parts. Specializes on such primary operations as straight or taper boring, form boring or form turning, drilling, turning, forming, facing and chamfering.

The 12" Chuck-Matic is an entirely new design. It is an air-operated automatic—cuts machine costs on short runs as well as long runs.

IT IS RUGGED—Heavy frame and new design gives you every advantage of modern tooling methods. Maintains precision, undisturbed by heavy feeds with high speed or carbide tipped tools.

IT IS FAST—Idle movements are cut to the minimum. Setup is quick and easy. Quick change from job to job. Adjustments easy through unusual accessibility.

UNSKILLED OPERATORS can run it. Automatic safety devices control both manual functions and mechanical movements—protecting operator, work and machine.

SPACE SAVING is a special advantage. Floor space required, 45" x 64". Convenient to locate. Operator can tend as many machines as job cycle times will permit. Bulletin SC-46

### The NATIONAL ACME CO.

EAST 131 STREET . CLEVELAND 8, OHIO

Acme-Gridley 4-6 and 8 Spindle Bar and Chucking Automatics - Single Spindle Automatics - Automate Time, Spindle Spindle Spindle Spindle Spindle Spindle Spindle Spindle and Control Station Switches - Solenoide Centrifuges - Contract Manufacturing

, 1946

Photograph courtesy Black & Decker Mfg. Co.



## HERE you need an

### **ARMOURCLAD FIBRE COMBINATION DISC!**

Armour Abrasives Help You Do Your Jobs Better

For better, faster finishing you'll need the fastest tools and the best abrasives possible.

In any operation . . . in cutting welds . . . in removing burrs . . . in leveling metal surfaces . . . there are

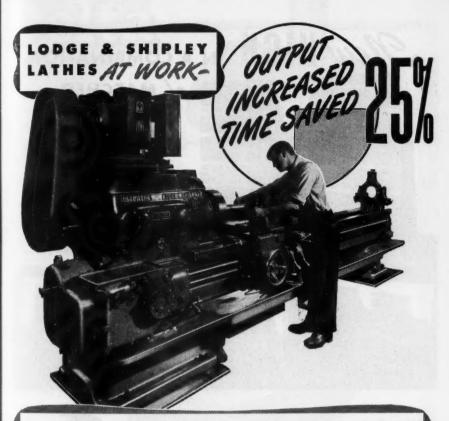
specialized ARMOUR ABRA-SIVES designed to do a better job at less cost. The faster, sharper, coolercutting Armourclad Fibre Combination Disc is only one of Armour's complete line of better metal-working abrasives.

It will pay you to call on Armour's experienced technicians. They will gladly help you choose the abrasives and methods which do your jobs best.



### ARMOUR Sandpaper WORKS

DIVISION OF ARMOUR AND COMPANY 1355 West 31st Street • Chicago 9, Illinois



The advantages of a new, modern machine tool is convincingly demonstrated in the plant of Streeter-Amet Company, Chicago, makers of precision weighing and recording equipment. Here, the new Lodge & Shipley 18" Engine Lathe has effected a 25% increase in production—AND in 25% less time than previously required.

At Streeter-Amet, this new L & S Lathe is used for a wide variety of work—turning, boring, facing and thread chasing parts such as axles, shafts, special gear blanks, aircraft landing struts, hydraulic cylinders,

and special lead screws. Streeter-Amet finds this new L & S Lathe "Very satisfactory for heavy duty and high accurate work ... holding work to tolerance of ±.0005".

This L & S Lathe is one of a new series of 18, 20 and 22 inch lathes—completely new in every detail from pulley to tailstock. These lathes can do your work better and at lower cost—possibly replace several older, war-weary tools. Write on your company letterhead for detailed Bulletins Nos. 503, 605, 606.



CINCINNATI 25. OHIO. U.S.A.

ENGINE -TOOL ROOM - AUTOMATIC - OIL COUNTRY LATHES

Lathe U

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THIS combination of matched units serves convenience and rigidity for accurately locating and chucking work when boring, milling, planing or for other toolroom and general use. They can be used singly or in variety of combinations for large or small work.

They are machined from box section castings, with Tee slots and flat surfaces in precise alignment.

They are made with the same tooling and quality as the JIGMIL

Each set includes Tee slot nuts, studs and screws.

Write for price and delivery!





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72 MODERN MACHINE SHOP

May, 1946

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# Delta

# Super-Hi-Speed Drill Press

... a sensitive, low-cost 14" machine for greater accuracy on small-hole operations

ew! For small-hole drilling of plastics, uminum, other metals. Dynamically-lanced motor. Three-step pulley, peritting speed range of 12,000 . . . 8000 . 5000 R.P.M. Movable motor mountg plate, to adjust belt tension. Speilly-selected Jacobs chuck. Spindle avel of 2½". • Five bench models. so 2-spindle, 3-spindle, and 4-spindle odels. Head, complete with motor, ailable separately, for use on your

esent 14" drill press colnns. • See your Delta dustrial distributor for e complete story on the elta-Milwaukee Superi-Speed Drill Press,



# Get Your Free Copy of Latest Catalog . . .

Describes in detail the Super-Hi-Speed Drill Press and other low-cost, compact, portable Delta-Milwaukee Machine Tools. Information that helps you do a creditable job of tooling up. Send coupon below today for your free copy. Famous Delta-Milwaukee quality construction features found in the Super-Hi-Speed Drill Press:

Double-sealed ball bearings that are lubricated for life. . . . Bearings that are pre-loaded to take up the play between balls and races, for more accurate operation. . . . Precision-ground spindles that eliminate end or radial play. . . . Spindle drive that transmits the action of the driving pulley with complete freedom from misalignment troubles. . . . Dynamically-balanced pulleys.

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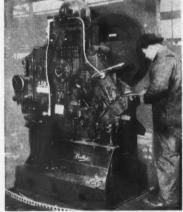
# FROM Lawn Mowers To Fractors



Literally, Buffalo Bending Rolls are used by the manufacturers of almost every type of rolling stock, large and small. Wherever there's a job which calls for curved metal—there's a place for Buffalo Bending Rolls to do the job better—and cheaper. If you are not familiar with the economies to be had with Buffalo Bending Rolls, write us, telling what you want to bend.

on

# FROM Brake-Bands To Bridges



Where metal is cut or punched, piecemeal or in production work, there is a "Buffalo" machine to do the job. Universal Iron Workers, used in thousands of shops, are combination punches, shears and bar cutters for general work. Buffalo Billet Shears are used for cutting forging stock. Other Buffalo machines include Rapid Acting Punches, Single and Double End Shears, Riveters and Sprue Cutters. Buffalo engineers will be glad to recommend a machine to fit your particular requirements. Write us.

# **BUFFALO FORGE COMPANY**

388 BROADWAY

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

BUFFALO, N. Y.



Machines for Metal Working



1800 gear teeth a minute, under average conditions, is the gear tooth pointing production you get with the Cross No. 60, even with unskilled or inexperienced operators. Operation is automatic—the work is clamped by means of foot-pedal control so that the operator's hands are free to feed and unload the machine. Standardized workholding fixtures accommodate a wide variety of internal or external gears.

Cross engineers have utilized the principle of synchronizing the motions of the gear and the economical hollow mill cutter to obtain this fast, accurate, automatic performance.

Small shops, handling short runs on a variety of work, find that changeover from job to job can be accomplished within 20 minutes with the Cross No. 60.

These and other features of the Cross No. 60—features that mean profitable operation—are detailed in a new Cross Catalog which is yours for the asking. The Cross Company, Detroit 7, Mich. Dept. 60.



CROSS

SPECIAL MACHINES

TURNING - MILLING - DRILLING BORING - REAMING - TAPPING - GRINDING

# you get a Clean Cut Job! on Strip, Bar or Formed Sections



Joden **CUTOFFS** 

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The variety of sections you can cut at speeds up to 200 feet per minute with Yoder cutoff machines is as varied as your needs. Angles, tees, simple channels or intricate mouldings or conduit, all are cut cleanly and accurately with steel dies mounted on a movable table. Ideally used in team with roll forming machines producing sections from strip stock. Also used to straighten or cut tubing, wire or rod, or fitted with dies or punches for perforating or embossing. Let us send you a booklet with complete details.



5532 Walworth Ave.

Cleveland 2, Ohio



3

BROWN & SHARPE TOOLS



ardened steel parts, bearings, connecting links, and other parts going into their sewing machines have been honed for several years at the Chandler Machine Company of Ayer, Mass.

Tolerance is held within .00025" with a very smooth mirror finish on the honed surface. Previous to using Sunnen honing, these parts were lapped—and copper laps were constantly wearing out, leaving bell-shaped holes. In addition to spoiling materials, lapping was

costing them a great amount of unnecessary production time.

Now, the Sunnen Precision Honing Machine is giving them smoother finishes in more accurate holes at least five times as fast.

If you have an internal finishing problem on which you need greater accuracy — or more speed — or a smoother finish, ask a Sunnen engineer to call, or write for a free bulletin giving complete details of Sunnen Honing.

# SUNNEN PRODUCTS COMPANY

7933 Manchester Ave., St. Louis 17, Mo. . Canadian Factory: Chatham, Ontario

- Typical Jobs



Cast Iron Valve Stem Guide. 1/2 to one thousandth removed — 220 pieces per hour. Better finish and straighter hole.



Carbureter Idler Valve Jet. Hole is honed after reaming for smooth action.



Stainless Steel Load Compensator Valve Seat. Hole is honed to .0002" limit.



inner Bearing Ring "Accurately removes last 'tenth' of stock,"



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Diesel Engine Fuel Injector Cylinder "So accurate that a piston can be fit within .00005 inch."

# FASTER PRECISION PRODUCTION

# 125 feet per minute longitudinal table speed with G&L's GRAND RAPIDS No. 55 Surface Grinder

Only GRAND RAPIDS Hydraulic Feed Surface Grinders provide such exceptional table speed. Both the longitudinal table travel and the cross feed are automatic, hydraulically actuated.

The Grand Rapids No. 55 Surface Grinder combines ALL these advantages:

- Longitudinal table speed of 125 feet per minute.
- Integral cast column and base assures permanent alignment of vertical head ways and cross saddle ways.
- \* Patented vertical movement of head wheel.
- Two spindle speeds. reduce wheel costs.

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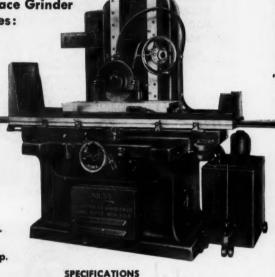
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- Bijur one-shot lubrication system.
- ★ Vickers vane type hydraulic pump.
- Portable, self-contained motordriven coolant system.



Automatic Table Travel—longitudinal 38", transverse 1334" • Working surface of table—12" x 36" • Standard wheel size—12" x 1" x 3" • Vertical movement of wheel head—18" • Spindle speeds—1925 and 2500 RPM. Floor space—150" x 102".

Write for catalog GL 101

# What "GRAND RAPIDS" Quality Means:

G & L cast their own close-grained gray iron, machine all parts to micrometric tolerances, and precision-assemble machinery of unsurpassed performance. Grand Rapids means top quality in Hydraulic Feed Surface Grinders.

GALLMEYER & LIVINGSTON COMPANY 308 STRAIGHT STREET, SW, GRAND RAPIDS 4, MICHIGAN



# UNIBAL SPHERICAL BEARINGS Smprove Your Products

SPHERICAL
BEARING
ROD END
MALE



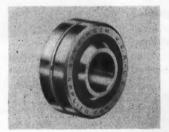
HERE is a precision-built bearing at a comparatively low cost which outperforms anything yet devised for the purpose. Used as a rodend, its operation is as free as an eyeball in a socket. There is no double row of balls to break and jamb even on fairly light loads. The Heim Unibal Bearing will carry heavy radial and axial loads.

SPHERICAL
BEARING
ROD END
FEMALE



WHERE motion is to be transmitted at odd and perhaps varying angles, the Heim Unibal Bearing will correct misalignment in any direction. Applications for bearings of this type in your products or machines are many. This new Heim Bearing was used successfully in millions of airplane applications during the war.

Unibal
SPHERICAL
BEARING



A PARTIAL list of products where Heim Unibal Bearings may be used includes: Electric fans, shoe machinery, textile machinery, engine controls for trucks and motors, marine applications, flexible couplings, cam followers, electrical equipment, sewing machines, road building machinery, printing presses, washing machines and laundry equipment, etc., etc.

# UNIBAL SPHERICAL BEARINGS AND ROD ENDS

PLEASE WRITE

THE HEIM
FAIRFIELD



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# Holy Smokes! They've done it again!



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Blast out a fanfare for a great new Woodworth invention!



it's the WOODWORTH AD-JUSTABLE THREAD Ring Gage.



Thread ring gages check the outside dimensions of threaded parts.



Adjusting 'em as they wear down saves time and ... noney.



But old types get pearshaped—lose accuracy wear out fast.



woodwo.t.'s New Thread Ring Gage adjusts perfectly-STAYS ROUND.



Never gets out of alignment when dropped or thrown about.



Wears 2 1/2 to 5 times longer—With equal distribution of wear.



Light Weight reduces operator fatigue-increases sensitivity.



ideal for hair-splitting



Woodworth's New Thread Ring Gage is an all-time champion!

### Another Woodworth Contribution to Production

THE NEW Adjustable Thread Ring Gage, another revolutionary Woodworth instrument of accuracy, is now available to industry!

Employing an entirely new principle of design, and proven mathematically correct by actual tests, this gage assures roundness through the maximum range of adjustment.

### Check these Five Important Advantages

1. Greater Accuracy and Stability. Stays round with adjustment. Threads held in alignment of thread helix angle with adjustment. Will not reject parts that should pass inspection.

2. Longer Wear Life. Equal distribution of wear over the full thread circumference, through the entire range of adjustment, increases wear life 2½ to 5 times.

3. Less Weight. Aluminum alloy outer body halves the weight to greatly reduce operator fatigue and increase sensitivity.

4. Positive Identification. Green outer body for GO GAGE and red for NOT GO GAGE saves time for operator.

5. Positive Adjustment. Cannot be thrown out of adjustment by ordinary blows or falls that change setting of conventional gages.

You can speed up production and decrease gaging costs on your thread inspection operations with this amazing instrument! Write for completely illustrated folder 46-R. ACCURACY YOU W CAN TRUST

# WOODWORTH

N. A. WOODWORTH CO., SALES DIVISION 1300 E. NINE MILE ROAD DETROIT 20, MICHIGAN

PRECISION GAGES

PRECISION MACHINED PARTS
DIAPHRAGM CHUCKS—SPECIAL TOOLS
ADJUSTABLE CLAMPING JIGS

# ROTO: CLONE

with
FILTER
AFTER
CLEANER

# .. solves grinding dust problems

Where individual machines create a dust nuisance, \*Roto-Clones equipped with AAF filter aftercleaners are the perfect answer to the problem. Exhaust hoods and ducts are simple and easy to install and the cleaned air may be returned to the workroom saving heat loss and extensive duct work to the outside. Roto-Clone is available in a wide range of capacities and types. Send for Bulletin No. 272.

# AMERICAN AIR FILTER CO., INC.

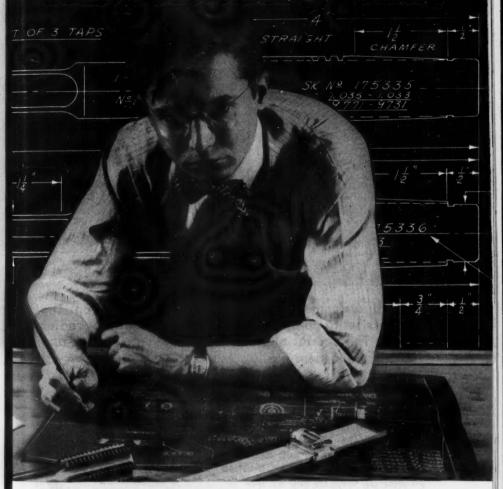
100 Central Ave., Louisville 8, Ky.
In Canada: Darling Bros., Ltd.,
Montreal, P. Q.

\*Registered Trade-Mark for a Dynamic Precipitator or Hydrostatic Baffle-Type Wet Collector.

TYPE D

ROTO-CLONE

# Your Threading GHQ





1946

When the man in charge of "operations" runs into a new problem, he usually looks to "General Headquarters" for help . . . In threading operations on all industrial fronts, the man with a problem is able to go to the engineering department of the Greenfield Tap and Die Corporation for expert help. "Greenfield" engineers can focus on any problem the cumulative "know-how" of years of pioneering leadership in screw thread research.

"Greenfield's" threading "GHQ" helps solve specific day-to-day problems for users of threading tools, and also carries on an intensive continuing program of research that benefits all users. If you have a threading problem, get in touch with "Greenfield" screw thread engineers through your "Greenfield" distributor.

TAP and DIE CORPORATION GREENFIELD. MASSACHUSETTS

# For Smoother Performance



# ATLANTIC Contour Cutting BAND SAW BLADES

You will welcome Atlantic Band Saws in your shop. The teeth are set to permit a smoother performance for radius cutting. The special alloy steel insures longer wear and you can weld them easily.

# IMPROVED PACKAGE

One of the strongest, most practical and convenient boxes on the market. Cutaway feature shows inventory at a glance.

Box is solid chipboard construction that won't come apart. Saw

securely held in coil form, no bothersome wires to cut. Required lengths freely removable. Marked on end as well as top of box for easy identification. Packed in all widths 3/32" to 1/2" wide in 100' lengths. Number of teeth as permitted by W. P. B. ruling.

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Send for Atlantic Band Saw Booklet

# ATLANTIC SAW MFG. CO., Inc.

Manufacturers of Metal Cutting Band Saw Blades Exclusively
155 Brewery St., New Haven, Conn.

MODERN MACHINE SHOP

May, 1946

\*One of si

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America's favorite high speed steel—for all cutting purposes.

### E. V. M.

For fine cuts and hard materials—higher carbon and vanadium content.

### **Red Cut Cobalt**

For hogging cuts, fast speeds, hard or scaly materials, etc.

# **Gray Cut Cobalt**

Provides the highest attainable cutting ability in a high-speed steel.

### Neatro

Remarkably wear-resistant, delivering top performance on abrasive materials.

# 6-6-2

For fine edge tools and finishing cuts. Wide hardening range.

### Vasco M-2

A tungsten-molybdenum general purpose steel, particularly adapted to fine finishing cuts.

# **Victory Cobalt**

For heavy duty cutting of heat treated steel, cast iron, etc.

All of the above steels are available in whits, bars, cold drawn shapes, solid forgings, ring forgings, sheet, plate, males, and drill rod.

\*One of the series of six Vasco Tool Steel Classifications covering every industrial requirement.

1946

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STEEL COMPANY LATROBE, PENNA.

Colonial Steel Division . Anchor Drawn Steel Co.



# These Wagner Motors HAVE BUILT-IN PROTECTION

Wagner motors that have built-in protection by virtue of their design and construction give dependable service year after year under operating conditions which would necessitate frequent shutdowns and replacements if ordinary motors were being used.

It pays to use Wagner protected motors in locations where dust, dirt, moisture, metal filings, chips, splashing or dripping liquids, acid fumes, explosive gases, or other such conditions would cut short the life of ordinary motors.

There is a Wagner protected motor specifically designed to meet the special conditions found in machine shops, chemical plants, refineries, and other manufacturing and processing plants. Four types of Wagner protected motors are shown at the left and described below.

- PWAGNER SPLASH-PROOF MOTORS are built to operate dependably in locations where they are subject to splashing water, oil, or other liquids. They are widely used in exposed outdoor locations, and are completely selfprotected against ice, sleet, snow, and rain.
- WAGNER EXPLOSION-PROOF MOTORS have been approved by the Underwriters Laboratories for Class 1 Group D hazardous locations, "where gasoline, petroleum, naphtha, alcohols, acetone, lacquer solvent vapors, or natural gas are manufactured, used, or handled."
- WAGNER TOTALLY-ENCLOSED FAN-COOLED MOTORS are designed to operate under severe and adverse conditions in locations where dust, dirt, abrasives, steel chips, filings, acid fumes, and other harmful elements may damage the windings and bearings.
- WAGNER TOTALLYENCLOSED NON-VENTILATED MOTORS may be installed in the locations listed
  under item 3, and are built
  instead of totally-enclosed
  fan-cooled motors in the
  smaller ratings where special
  provision for cooling is unnecessary. In the larger ratings they are used where the
  draft produced by the fancooled motor is objectionable.

Write for Bulletin MU-185 addressing your request to Wagner Electric Corporation, 6448 Plymouth Avenue, St. Louis 14, Missouri, U. S. A.

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### Consult Wagner Engineers on all Electric Motor Problems

Electric Motors • Air Brakes • Brake Lining Hydraulic Brakes Wagner

Transformers • Industrial Braking Systems NoRoL • Tachograph



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# PRECISION

Dynamically balanced design.

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ETROIT 2

1946

- Guaranteed to turn or bore within .0002" dia. in five inches.
- Self-centering collet work-holding method.
- Vibration-free ballbearing spindle.
- \*Positive turret reindexing within .0003".

# VARIETY

- Eight successive operations finishmachined at one chucking.
- Internal or external thread chasing.
- Double tool slide for straight or taper turning, forming or cutting off.
- Uses push-out or draw-in collet, step or jaw chuck.

# EASE OF OPERATION

- Single lever spindle speed control.
- Self-locking turret head.
- Positive stops for duplicating size.
- Vee-belting replaceable without disturbing spindle or drive.
- Automatic brake; pneumatic bar feed.



The Rivett No. 918 Plain Cabinet Turret Lathe is an efficient producer of small duplicate parts. The combination of true running work and precise tool indexing creates a place for this turret lathe in fine manufacturing.

If you have a production problem requiring second operation or initial machining of small finely made parts from stainless steel, brass, plastic or other material, the Rivett 918 guarantees a lower cost solution. Write for Bulletin 918T.

RIVETT LATHE & GRINDER, Inc.

BRIGHTON . BOSTON . MASS. . U. S. A.

# It's a matter of seconds to tighten a nut

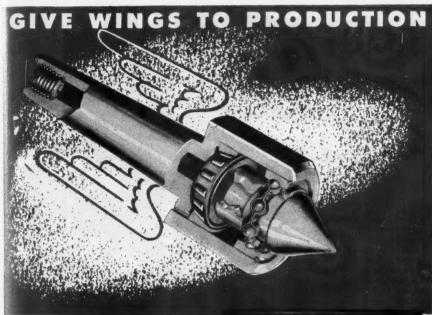


# with a CP Universal Nut Runner

CP Universal Electric Nut Runners are big time-savers in automobile and airplane assembling, furniture and cabinet making, sheet metal fabrication, building construction, marine and railroad work. Wide range of capacities, from CP Midgets for nuts up to 3/16", to heavy duty models for nuts up to 1" and lag screws to 5/8" x 6". CP Universal Nut Runners can be furnished with reversing switches for backing off nuts, also Right-Angle models. Write for Catalog No. 899.

Chicago Pneumatic manufactures a complete line of Universal Electric Tools — Drills, Reamers, Tappers, Screw Drivers, Nut Runners, Grinders, Sanders, Buffers, Flue Rollers, Hammer Drills, Sealers, Files.





# IDEAL "Multi-Duty LIVE CENTERS

Speed up machine output by making it possible to turn heavier loads, take deeper cuts, at higher speeds.

A real precision tool that assures accurate turning. Has precision bearings—both, ball bearings for radial load, tapered roller bearings for thrust load.

4 Inserts for holding centered and uncentered work are quickly interchangeable. Save set-up time! A further help in cutting machinery costs.

### New IDEAL Heavy Duty LIVE CENTERS

For Those Larger Turning Jobs—Accurate to .0005".

Eor Complete Information Write for FREE Machine Tool Catalog.

**Machinery Products Division** 

# IDEAL INDUSTRIES, Inc.

ION PARK AVE. STEAMOR

Designed for Machine Shop Use

# MACHINE SHOP ETCHER

Electrically writes on smooth-surfaced iron, steel and their alloys. Permanently marks reamers, drills, dies, etc. . . . 14 Heats.



Other IDEAL Accessories include: Lathe and Magnetic Chucks, Demagnetizers, Grinding Wheel Dressers, Dust Collectors, Granite Surface Plates, and the Most Complete Line of Markers and Etchers on the market.

Prompt Delivery

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Sales offices in Principal Cities - Consult your local telephone book - In Canada: Irving Smith Ltd., Montreal, Quebec

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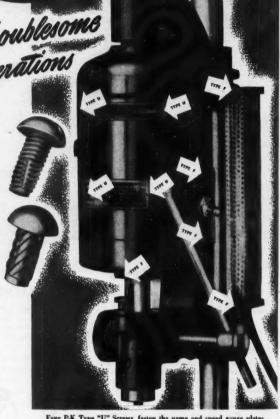


Why make fastenings the hard, higher cost way when you can cut assembly time and get stronger fastenings with P-K Self-tapping Screws? Like Electro-Mechano Company of Milwaukee, for instance. Eleven tapping operations eliminated in assembly of their High-Speed Precision Drill Press, some of them at difficult angles. Losses from parts spoilage and broken taps ended. That's common sense assembly engineering!

It's just good sense to take a long, thoughtful look at your present fastenings and fastening methods. If P-K Screws can be used in your product, they're sure to make a better assembly, at real saving. In 7 out of 10 assemblies submitted to us, P-K Screws permit improvement in strength, and workhour savings up to 50%.

Aska P-K Assembly Engineer to look over your assembly and see if it's one of the lucky seven. Or, mail assembly details to us for recommendations. Either way, it's a sensible first step toward making the savings you're missing. Parker-Kalon Corp., 208 Varick St., New York 14.

**Sold Only Through Accredited Distributors** 



Four P-K Type "U" Screws, fasten the name and speed gauge plates. Type "F" Screws fasten the resistor and condenser casing to the motor bracket, eliminate tricky tapping at an angle. Another, below the motor housing, acts as a hardened depth stop. Two others fasten the switch plate.



A FASTENING FOR EVERY METAL AND PLASTIC ASSEMBLY

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# This 12,500% increase



But True!... In crush form grinding a modified butress thread form on the new Thompson Truform Grinder it was possible to increase production 12,500% without disturbing the set-up!

The secret of this achievement lies in the fact that Thompson Truforming involves a machine engineered and built as a single unit and uses two crushing rolls . . . a "work roll" and a "reference roll." Whenever the "work roll" loses form, the original degree of accuracy is quickly transterred from the "reference roll" back into the grinding wheel and then reground into the "work roll" . . . all without disturbing the set-up.

In this way the "work roll" can be re-processed whenever it loses form and can be used for hundreds of additional dressings, or until it is worn out. In the example mentioned above, it was possible to get over 15,625 additional dressings from the "work roll". This means an increase in continuous production of 12,500%.

So many people have asked about the details of this new Thompson process that a special 8-page leaflet has been prepared with diagrams and answers to questions about Truforming. Just write for—"Tell me about this process," Address Dept. 13.

THE THOMPSON GRINDER COMPANY
SPRINGFIELD, OHIO



1946

# More power to you More speed to you More profit to you

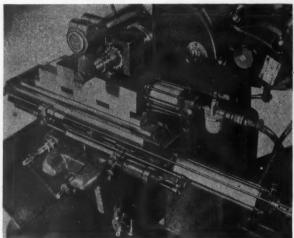




Photo shows Nichols power feed attachment installed. In this case, work is held in an air-operated vise

# ... with the New Nichols Power Feed Attachment

Here is a tested and proved power feed attachment that is an added production asset for any Nichols Miller. It is designed to reduce the time of the operating cycle and reduce the operator's duties so that often one operator can run two or more machines.

This power feed attachment is designed for fast table advance - maximum proper cutting feed -- fast table return - automatic shut-off. It is completely automatic except for loading and unloading the work. Rapid traverse and work speeds are easily and quickly changed to suit

all classes of jobs within the capacity of the machine.

Basically this attachment is a Bellows air feed unit used in conjunction with a Hydro-Check. Thus a positive, infinitely variable feed is obtained throughout the 9" maximum cutting stroke by using regular shop air lines with 75 to 175 lbs. pressure.

The Nichols power feed attachment can be installed either before or after shipment of the Nichols Miller. It can be installed quickly on any Nichols Miller ever built. Write for details.

Send for free Nichols Miller Catalog

THE Nichols M

MANUFACTURED BY W. H. NICHOLS-& SONS, WALTHAM, MASSACHUSETTS

NATIONAL DISTRIBUTORS: NICHOLS-MORRIS CORP., 44-A CHURCH ST., NEW YORK 7, N. Y.



May,



• THE ONE MACHINE that generates the form direct on, End Mills, Tool Bits, Milling Cutters and similar tools in high speed and tungsten carbide without first forming the grinding wheel; also forms grinding wheels.

THE IMPROVED MEYERS RADIFORM NOW AVAILABLE For further information and details wire or write

W. F. MEYERS COMPARY . ISTABLISHED 1888-1014 FOURTEENTH STREET . . . BEDFORD, INDIANA

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946



minute accuracy, uniform excellence makes them exceptionally serviceable in speeding production and cutting costs.

The "Unbrako" Socket Head Cap Screw (left) is a time-and money-saver, because its knurled head provides a slipand fumble-proof grip, even for oily fin-gers so it can be screwed in faster and farther before it becomes necessary to use a wrench. The knurls may also serve to lock the "Unbrako" in place.

Both screws in sizes from No. 4 to 11/2". Write for the "Unbrako" Catalog. "Unbrako" and "Hallowell" products are sold entirely through distributors.

The ''Unbrako'' Socket Set Screw with the Knurled Point (right) is a Self-Locker, be-cause the knurled points dig-in and hold firm . . . against even the most stubborn vibration! Yet, this screw can easily be backed-out with a wrench and used again and again.

> **Knurling of Socket** Screws originated with "Unbrako" in 1934.

OVER 43 YEARS IN BUSINESS

### STANDARD PRESSED STEEL CO.

JENKINTOWN, PA.

**BOX 556** 

Branches: Boston • Chicago • Detroit • Indianapolis • San Francisco • St. Louis



MODERN MACHINE SHOP

May, 1946

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# SHORT RUN PIERCING

(1 to 500 Pieces of a Kind)

# can be ECONOMICAL!

The Wiedemann Turret Punch Press for short run piercing is the ONLY equipment that will produce otherwise expensive work at long run low cost.

Short run piercing of sheets and plates up to %" thickness is performed in less than one-quarter the time required on conventional equipment and traditional methods.

A Wiedemann Turret Punch Press will pay for itself in two years or less in labor time saved to produce short run work.

On long run jobs, where the quantity of pieces being produced makes it economical to tool up with mass production multiple punches and dies, you'll find a Wiedemann ideal for pre-production piercing of sheets and plates. You need not wait weeks or months to tool up . . . a Wiedemann Turret Punch Press will absorb the time lag.

### Typical Short Run Work

Custom-made instrument panels, chassis and frames, experimental models, knock-out boxes, bus bars, general sheet metal and plate work, etc.

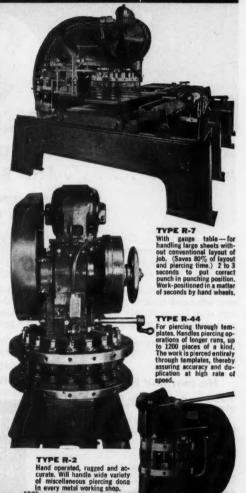


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Write today for Bulletin 92... facts about speeding up short run piercing with the Wiedemann Turret Punch Press.

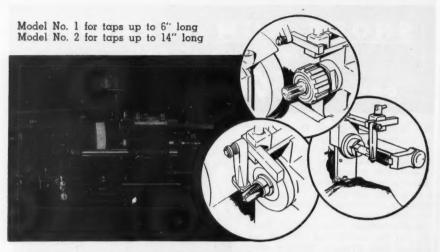


TYPE R-5 Highly versatile—for short runs on such work as special outlet and conduit boxes as well as thin sheet and other piercing. Also used for piercing copper.



WIEDEMANN MACHINE CO. PHILADELPHIA 22, PA.

WIEDEMANN TURRET PUNCH PRESSES & .....



# A SPEEDY SOLUTION TO YOUR TAP SHARPENING PROBLEMS . . . . . THE BLAKE TAP GRINDER

Grinds the chamfer angle and the relief on all the flutes in one continuous operation.

With the Blake Tap Grinder, you can sharpen your dulled taps with one setup and in one continuous operation. The whole process takes very few minutes and saves you not only the cost of new taps but also keeps your production from bogging down—you won't have to wait for new taps.

The Blake is small, inexpensive and self-contained. It sharpens accurately both right-and left-hand taps . . . with 2, 3, 4, 5, 6, 8 or 10 flutes . . . from size No. 0 to 2" dia. It can also be profitably used to sharpen countersinks, 3- and 4-flute drills, step drills and many other tools requiring relief on the point.

Investigate the speedy and profitable Blake method of sharpening taps. Send the coupon today for complete details, without obligation.

### No machine is better than the cutting edge of the tool it uses.

BLAKE TAP GRINDERS—FILTAIRE PORTABLE DUST COLLECTORS— AMERICAN TOOL HOLDERS—BLACK DIAMONI

PRESISION DRILL GRINDERS—WALTHAM CUTTER SHARPENIRS—HAGER CARBIDE TOOL GRINDERS



MILLIONS of whirling abrasive "wheels, trained in war's tough school of precision finishing—all set and eager to tackle civilian goods now that peace machinery is going.

Whether it's removing burrs, smoothing edges, squaring surfaces so accurately that the finish can be measured in micro inches, or cut-off work—there's a Chicago ready to do a top-ranking job for you.

VITRIFIED GRINDING WHEELS up to 3" in diameter.

MOUNTED WHEELS. Largest assortment made.

**CUT-OFF WHEELS.** All types and sizes. Made with the sensational new special-formula RT Bond (rubber or resinoid).

64-Page Catalog on request

### SEND FOR TEST WHEEL



Learn first-hand about Chicago's superiority. Tell us what you have to finish, size wheel you'd like and we'll mail one promptly.

Chicago	Wheel	&	Mfg.	Co.	
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Dept.	MM,	Chicago	7,	111

Send Catalog. Wheel 🗆 Cut-o	Interested in G	rinding Wheels DMounted Test Wheel. Size
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Address		

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# 3 Exclusive Operating Features

CONVENIENCE of Operation: Hand operating lever may be set on right or left hand side, and in either vertical or horizontal position.

EASE of Operation: It requires less than 5 lbs. pressure to open the collet.

CHOICE of Operating Sequence: Simple adjustment of two screws gives the operator a choice of two operating sequences.

For Details and Specifications write for Circular 453.

# SCHAUER MACHINE CO.



2060 READING RD.

CINCINNATI 2, OHIO

May, 1946

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You will find REID PRECISION

SURFACE GRINDERS BUILT TO HANDLE YOUR WORK IN AN EFFICIENT AND TIME-SAVING WAY. EVERY POSSIBLE IMPROVEMENT HAS BEEN MADE TO ASSURE YOU CLOSE TOLERANCE AND A FINER FINISH AT LOWER COST. ALL WORKING PARTS ARE DESIGNED AND FITTED TO PREVENT ABRASIVES FROM PENETRATING AND CAUSING UNDUE WEAR. ACCESSIBILITY AND NEW DESIGN OF HANDWHEELS ASSURE YOU ACCURATE FINGERTIP CONTROL — AN OUTSTANDING PRECISION MACHINE.

BALANCED DESIGN-ATTRACTIVE FINISH

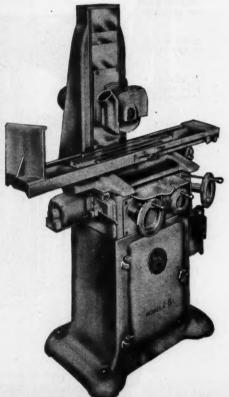
MODEL 2-B ALL-ELECTRIC POWER-FEED.

THE REID MODEL 2-C HAND-FEED ALSO IS AN EXCEPTIONAL MACHINE FOR TOOL, GAGE, DIE AND GERTAIN PRODUCTION GRINDING.

MACHINES EQUIPPED FOR WET GRINDING IF REQUIRED.

# **EXCELLENT DELIVERIES**

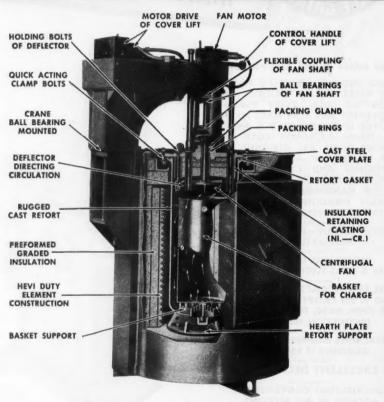
DISTRIBUTORS CONVENIENTLY
LOCATED IN ALL SECTIONS.
WRITE DEPT. E FOR
ILLUSTRATED BULLETIN AND PRICES.



REID BROTHERS COMPANY, INC.

946

# Standard Uses of LL PAVI DUTY CARBURIZER CARBURIZING NITRIDING DRY GYANIDING BRIGHT ANNEALING CHAN HARDENING



Typical Construction of the Hevi Duty Carburizer

Send for Bullelin HD 142

# HEVI DUTY ELECTRIC COMPANY

MILWAUKER, WISCONSIN

May

Sturtevant.

TORQUE

don't gamble your reputation!

Eliminate product failures and rejects caused by warping, stripping or under-tightening of screws, bolts and threaded parts. Insure the complete performance of your products by speedy assembly with Sturtevant Sensory Torque Wrenches.

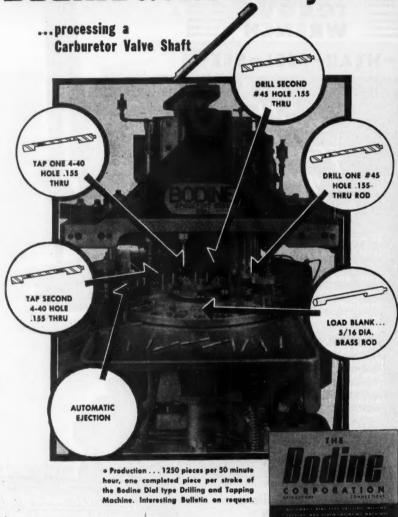
Far faster than other production Torque Wrenches (because operation is by automatic reflex-action). Sensory Wrenches are infallibly accurate, for accuracy too is automatic.

World's largest manufacturer of Torque Wrenches-31 capacities.

> Write for Bulletin No. SW-18.

PA STURTEVANT CO. ADDISON QUALITY ILLINOIS MODERN MACHINE SHOP

# **Boding**...Case History Nº 16



MODERN MACHINE SHOP

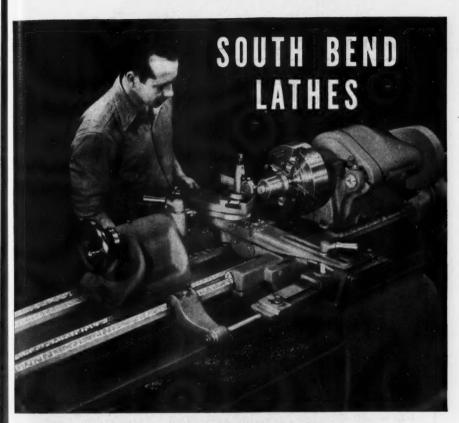
May, 1946

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# Designed for TODAY'S Needs!

South Bend Precision Lathes are designed and built to meet the exacting needs of today's industries. Their accuracy, and ability to handle a wide variety of operations, raise standards of quality in the toolroom, speed tooling, keep costs to a minimum. These same features—plus speed, ease of operation, and dependability—raise quality levels in the manufacturing plant, step up the flow of production,

lower costs by reducing the amount of "machine scrap," and, in some instances, by eliminating the need for one or more finishing operations.

Made with 9", 10", 13", 14½", and 16" swings, with collet capacities up to 1", and with bed lengths to 12', there is a South Bend Lathe that will meet your most exacting requirements. Write for Catalog 100-D which contains specifications.



1946

SOUTH BEND LATHE WORKS
LATHE BUILDERS SINCE 1906
427 EAST MADISON STREET . SOUTH BEND 22, INDIANA

# Now...Elgin Sapphire Tipt

# MICROMETERS



# 2,000,000

### PRODUCTION GAGINGS

The original Elgin Sapphire TiptMicrometer is in use without wear after more than 2,000,000 gagings in a drill plant. READY FOR SHIPMENT NOW.

1"-\$25, 2"-\$26.50, 3"-\$28.

Discount on quantities. Elgin
Sapphire Gages have been
out-wearing steel as much
as 7,000 to 1. Now Elgin
Sapphirehasbeen mounted
on the anvil and spindle of
a superbly engineered
lightweight micrometer.
SEE THE ELGIN MICROMETER

FEATURES: Sapphire Tipt Anvil and Spindle • Adjustable Spindle Bushing • Hollow, Lightweight Frame of Stabilized Steel • Tool Steel Hardened-Ground Spindle Thread • Positive Lock Nut • 1/10 Thous and the Graduations (by precision graduating machine) THE LAST MILL Light

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### SAPPHIRE PRODUCTS DIVISION

Elgin National Watch Company, 932 Benton St., Aurora, III.

### REPRESENTATIVES IN CITIES FROM COAST TO COAST



· ELGIN· Sapphire Gages

DIMENSIONAL FIDELITY IN GAGING OPERATIONS

104

Van Keeren

SOUD SQUARE MASTER BLOCKS

# THE LAST MILLIONTH

Light wave bands show that two Van Keuren Solid square Master Blocks are flat and parallel to the last millionth of an inch The square design permit this accuracy to be produced and maintained.



Your next set of gage blocks should be something special.

Blocks to perfectly flat and parallel that they may be call

Blocks made of steel which will expend and contract similar to

Blacks of a permanence which insures accurate measurement

Blocks having large well proportioned lasting surfaces which will retain their original perfect fletness and parellelism.

Blocks which are finished true and square on all sides.

Blocks made by craftsman having over 25 years' experience

you have known.
- Van Kouran Solid Square Master Blocks have

Van Kouren Solid Square Master Blocks have these qualifications. The complete 85 block set sells for \$750.00, the 41 block set for \$375.00. They will pay their first cost many times over

log No. 33 giving complete Specifications of Solid Square Master Blocks and other Van Keuren precision measuring tools.



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CO. 177 WALTHAM ST., WATERTOWN, MASS

Light Wave Equipment - Light Wave Alicrometers - Gauge Stacks Young Insert Plag Suges - Wire Type Plag Suges - I Research Wires - Plag & Manually Wires - Control of System - Char Manually - Christian Burg Control - 2 - South Statute Wire

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There have been many changes in lubricants. Fiske Brothers Refining Company has contributed greatly in the development of more efficient and more effective cutting oils. Are you enjoying the benefits of these improvements? Let us compare the results you can get from Fiske cutting oil with the oils you are now using. Fiske Oils are sold only on a "results" basis. Write today for information and literature.

# FISKE

Metal Working

# LUBRICANTS

FISKE BROTHERS REFINING COMPANY NEWARK 5, N. J. TOLEDO 3, OHIO

Since 1870

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tables

### Assembling Gears on Camshafts

# MULTIPRESS job for

THERE'S nothing better than smooth, exactly controlled hydraulic power for—among hundreds of other tasks—assembling gears on shafts...

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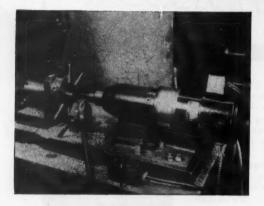
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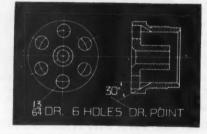
MULTIPRESS frame. These include automatic cycling controls, straightening fixtures, indexing tables, benches, bolsters, extension tables, and a host of others! Get the complete MULTIPRESS story . . . Write today!



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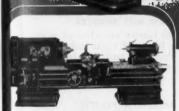
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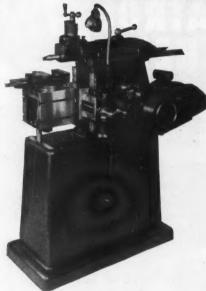
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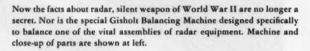
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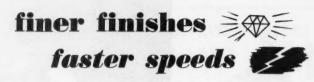


\*Developed jointly wish Westingbouse Electric Corporation

GISHOLT MACHINE COMPANY 1219 E. Washington Ave. . .

Look Ahead . . . Keep Ahead . . . with Gisholt

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DEPT. MM-1

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Long before Pearl Harbor, Dremel MOTO-TOOL won its spurs by the way it tackled tough jobs in tool rooms and machine shops, and on production lines. But when American industry swung its full strength into war production and our armed forces established for flung assembly and repair bases the already healthy demand for these mighty little midgets quadrupled.

Operators of Moto-Tools are ever discovering new jobs...new ways to save time and cut costs... with these pocket size machine shops. Girls quickly become proficient with them because a Moto-Tool weighs but 13 ounces, is shaped to fit the hand, has a balanced armature to prevent vibration. Thousands of Moto-Tools helped make the atomic bomb... were used to establish production records in plants such as General Electric, Westinghouse, Remington Arms, Ford, Nash-Kelvinator, Consolidated Aircraft, Northrup, Douglas, and many others.



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1946



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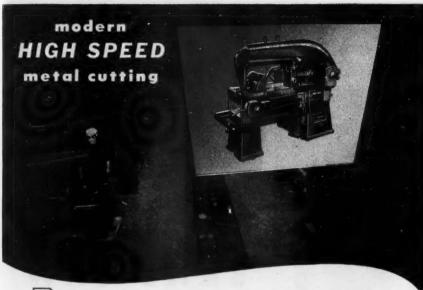
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FOR TOUGH JOBS SPECIFY

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RIVITORS AIR AND HYDRAULIC CYLINDERS CUTTERS CLINCHOR

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## That lowers production costs

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Guides handle blades ½" to ¾" wide.

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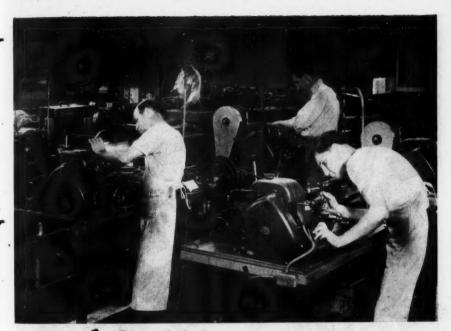
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Blind machining and threading on  $1\frac{1}{2}$ " x  $\frac{1}{2}$ " diam. parts to .0002 precision with Atlas 10" lathes enabled the Burlake Mfg. Co., Burbank, Calif., to end the need for painstaking individually fitted assemblies of hydraulic valve cages. Results were so satisfactory Burlake reports that dollar for dollar their 4 Atlas lathes are the best investment in the plant.

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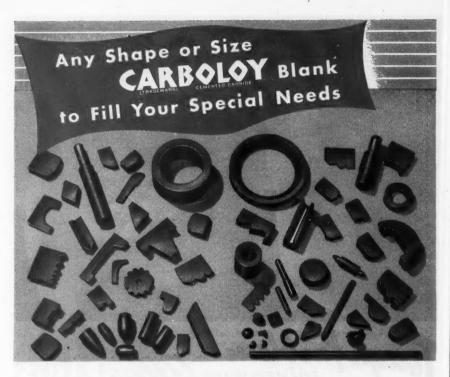
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## Machine Shop

HOWARD CAMPBELL, Editor

VOLUME 18 • NUMBER 12 MAY, 1946

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Over the Editor's Desk .

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1945

## RMSTRON



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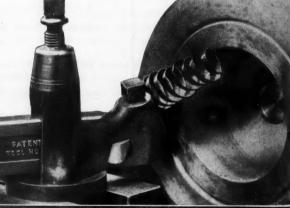
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ARMSTRONG Carbide TOOL HOLDERS for ARMIDE and similar carbide-tipped cutters.





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# Machine Shop

MAY, 1946

Vol. 18, No. 12

CINCINNATI, OHIO

#### This Month

In line with our policy of presenting, at intervals, discussions of the various metalmanufacturing operations and the equipment available for facilitating these operations, we are pleased to present as our feature article this month a discussion of "Modern Engraving Methods and Equipment" by John E. Hyler. The article is intended to supply the answers for anyone who is wondering whether such equipment will be useful in his plant or who is contemplating the purchase of an engraving machine. Page 124.

On page 138 we present an outline of the "lost wax" process of precision casting as this job is handled at the plant of the Haynes Stellite Company, Kokomo, Indiana. The lost wax process of casting is interesting and henceforth will fill a much more important place in modern metal manufacturing than it has heretofore. We will make one correction, however; the article states that "the process was practically forgotten until some 30 or 40 years ago," whereas we just learned the other day that it is still in use in the jewelry industries. The fact is that modern metal manufacturing is fast becoming a fine art.

Again we bring our readers an excellent article on the subject of Induction Heating and again the author—Gilbert C. Close—presents some new wrinkles in this highly efficient technique. The article is presented on page 172.

Although no longer considered as strictly "new," diamond tools are still sufficiently new so that good, practical information on the use of these tools is welcomed by many plant executives and engineers who have been considering the possibilities of such tooling. These readers will be interested in the article "Diamond Tooling for Bearing Surfaces" which will be found on page 198.

Again this month we are privileged to present a guest editorial by an outstanding industrial figure—William H. Wilkerson, President, The Auto-Soler Company, Atlanta, Georgia. Page 244—and don't overlook it. Mr. Wilkerson discusses a point in which we are all interested.

Added to the above are the usual "Ideas from Readers" and "New Shop Equipment" sections and the monthly cartoon.

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## Modern Engraving Methods and Equipment, I

The first part of a three-part article comprising an outline of the various types and kinds of operations for which the engraving machine is ideally suited and the types and kinds of machines available for these operations.

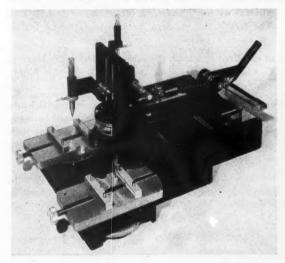
By JOHN E. HYLER

THERE was a day when engraving operations had far less to do with machine shop operations than they now do. References to engraving were

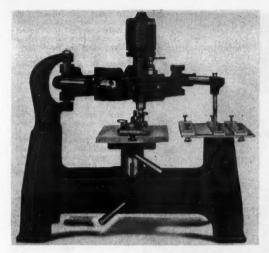
at that time regarded as having application either to photographic processes or to jewelry manufacture and ornamentation, and to go no farther.

Extension of the engraving process into machine shop and kindred work has reached the point where it joins hand-in-hand with profiling and duplicating of small parts, with intricate die and mold work, and so on.

In a good many cases it is difficult to determine where one of the pro-



With the machine shown here, made by Auto Engraver Company, of New York, letters, figures and designs of various types can be cut in metals or plastics. The machine is equipped with a micrometer control for the depth of the cut.



The machine shown here is equipped with an automatic depth-of-cut regulator for cutting on uneven, concave or convex surfaces and en workpieces which vary in thickness. The pantograph can be set te various ratio settings from 1.8:1 to 5:1. By changing the head, it can be transformed from a rotary engraver to an electrical etcher or acid etcher of the pantograph type. (Photo courtesy H. P. Preis Engraving Machine Co., Newark, N. J.)

cesses leaves off and the other begins. Engraving machines which handle tiny cutters 1/10 inch in diameter have, in some cases, facilities and sufficient power to operate end-milling cutters % inch diameter up to their capacity in steel. Therefore the term engraving, in metal-working shops, is difficult of rigid definition, and by

many is construed to include the full wide range of work that can be handled on some of the more highly developed and powerful engraving machines. Thus considered, engraving is indeed a highly important subject.

There are certain instances

where engraving tools and processes which apply to photographic and jewelry work have a moderate tie-in with machine shop practice. Scribers of the type used by engravers for marking and tracing on metal are also used

as scribers to a considerable extent in machine shop, for different kinds of layout work.

There is, too, the interesting fact that zinc etchings, made by a photoengraver direct from a drawing, have been and are sometimes used for reproducing raised patterns of intricate design in steel dies, using the etching

Heavy-duty bench-type unit that can be used as a rotary engraver, electrical etcher or acid etcher simply by changing the head. The pantograph ratios available on this machine range from 1.7:1 to 7:1. A forming guide attachment makes it possible to engrave evenly on concave, convex or spherical surfaces. (Photo courlesy H. P. Preis Engraving Machine Co., Newark, N. J.)



May, 1946

MODERN MACHINE SHOP

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, 1946



In the production graduated dials, dials are first graduated on a Gorton Graduating Machine, then the numerals are engraved in the Gorton Two-Dimensional Pantograph shown here. Equipped with a circular index dial in combination with a standard Gorton Indexing Fixture and Forming Guide, the machine is set up for manual indexing. If greater production is required, the dial should be mounted on a Gorton Roll Attachment which indexes automatically, as the engraving proceeds, from a flat strip of copy substituted for the copy dial shown above.

(Photo courtesy George Gorton Machine Co.)

for a master in the engraving machine. Where this is done, the photoengraver etches the plates deeper than for ordinary printing practice. In some cases, it is possible to etch them 1/32 inch deep.

As for jewelry production, the engraving machine as we have it today is the ideal piece of equipment for making steel dies and hobs required by the manufacturing jeweler. Obviously, the tool and die shop equipped with an engraving machine capable of such work is as free to manufacture dies for jewelry and other fine lines of work as it is to engage in the usual lines of tool and die work.

Machine engraving, as well as other similar work hereinafter discussed, is based on the use of a tracer controlled from a master pattern, and the reproduction of the pattern, either at the same size or on some predetermined scale, by means of a pantograph.

Originally, the pantograph was an

instrument used only for reproducing drawings at a predetermined different

scale which could be varied within the limits of the machine. Now, on the engraving machine, it reproduces a drawing, a template or a model as an engraving, as a profiled part, or as some other form of duplication, by means of cutters. In other words, using the pantograph, the tracer is governed by the master (whether the master be drawing, template, or model) and the cutter is governed in turn by the motion of the tracer as it follows the master:

Iron, aluminum, brass, soft steel, copper and all kinds of plastics can be engraved to a high degree of accuracy with some of the small machines on the market. They are used to engrave letters of block or of shaded script variety from master type, and it is possible to trace emblems and signatures from original drawings or from master templates. Micrometer control is provided for the depth of the cut, and engraving can be accom-

plished on either flat or round surfaces.

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or i in Engraving of small nameplates, panels and barrels is handled to advantage on one small portable type of machine that has attracted favorable attention. This unit is about the size of a typewriter, and can therefore be very readily moved from place to place. It does not take long for unskilled labor to master the use of this machine, whether on soft steel, brass, aluminum, or plastic material. Such materials as wood and Lucite are readily engraved with this unit.

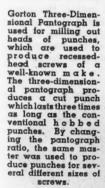
The engraving cutter works through a sort of nozzle, or depth gage which, contacting the surface of the work, holds the depth of cut constant. The pantograph on this particular unit is fixed as to its ratio (many machines have adjustable pantographs so that different sizes of cuts can be made from the same master pattern) but it can be obtained in a ratio of 1 to 5, or a ratio of 1 to 2½. It is general practice to make the pattern or master

much larger than the engravings that are to be made. In this way, it is easier to guide the style or tracer, and any existing inaccuracies in the master are much reduced in the work proper.

#### **Processes Allied to Rotary Engraving**

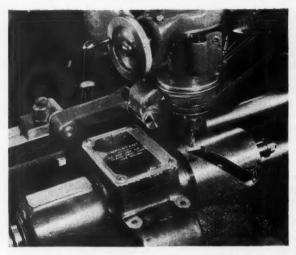
Engraving machines and processes used in the machine shop, for the most part, involve the use of a spindle in which rotary cutters of end-cutting variety are used. There are cases, however, where the actual removal of metal by a rotary tool is dispensed with in favor of etching, when the chief end in view is marking process. Either electrical or acid etching may be employed. Some of the leading manufacturers of engraving machines also manufacture outstanding electrical-arc, pantographic etchers with which given designs from masters can be etched.

One manufacturer makes a pantographic machine that can be made into a rotary engraving machine, an electrical etching or an acid etching machine, as desired, simply by substi-



(Photo courtesy George Gorton Machine Co.)





Milling an irregular port in a rotary valve for 1,000 h.p. Diesel engine, using a Gorton Tracer-Controlled Pantograph equipped with a Gorton Roll Attachment. Material: nickel steel tubing with 7/32-inch wall. Time: rough, semi-finish and finish cuts complete, floor to floor, 30 minutes.

tuting different units on the basic machine. The acid etching method is applicable where very fine and accurate markings are wanted, such as designs, trademarks, graduations, lettering on gages, gage blocks, tools or hardened steel parts, where electrical etching is not practical or desirable and where it is desired to avoid removing any metal. Such acid etching can also be applied to glass products of all descriptions.

**Diamond Point Cutters** 

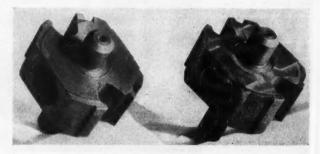
Acid etching by no means stands alone in its application to the engraving machine for making fine marks on hardened steel, glass and similar work, however. One of the leading manufacturers of rotary engraving machines provides a line of diamond-point cutters for these purposes. The

diamond used in the tool has six flats. The point is finished to a 120-degree included angle, and it will make cuts 0.003 inch to 0.005 inch deep in hardened steel. A similar diamond tool has been developed for very fine engraving on bakelite and fibrous materials, but it has a much more delicate point, with a 90-degree included angle. This more delicate point does not have sufficient stamina for use on steel.

On any engraving machine equipped with facilities for adjusting the pantograph for different ratios, the area which can be covered with the engraving cutter, without re-setting either the master pattern or the workpiece, always varies according to the reduc-

Left: refrigerator cylinder, unfinished, as it comes to the machine. Right: after the relief has been profile-milled in a Gorton Three-Dimensional Pantograph. Simply by guiding the pantograph tracer in a three-time oversize serpentine groove in the master templet, the relief is milled at one pass. Time: 12 seconds.

(Photo courtesy George Gorton Machine Co.)



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Cutting an intricate design in a die block, using a Gorton Three-Dimensional Pantograph and a G: 1 Master. The tool steel die block was finished complete in 6½ hrs. (Photo George Gorton Machine Co.)

tion rate. The smallest model engraving machine made by an outstanding builder has many different ratios which can be used, varying from 1:1 to 1:40.

When the machine pantograph is set for 1:1, making the work

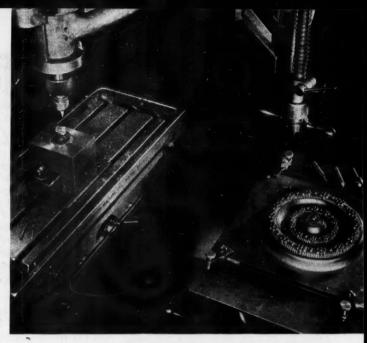
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the same size as the master, a circular area  $8\frac{1}{4}$  inches in diameter can be reached on a flat surface, or a rectangular area  $6\frac{1}{2} \times 9$  inches, or a long strip  $2 \times 17$  inches.

The actual full area that can be covered is irregular in form, but the dimensions of all of the regular forms mentioned above can be inscribed within it.

Taking the 1:12 reduction, which produces work one-twelfth the size of the master copy, a circular area 1% inch diameter can be reached on a flat surface. A rectangular area  $1\frac{1}{2}$  x  $2\frac{1}{2}$  inches can be reached, or a long strip that is  $1 \times 3\frac{1}{2}$  inches. These dimensional possibilities, as against the ones cited for the 1:1 ratio, provide an idea as to the manner in which working areas are reduced with changes in reduction ratios.

In operation, the tracer point or stylus is guided around the outline of the outline of the copy type, template or other master used. This machine is



highly precise, and is capable of engraving characters in relief that are only 0.002 inch high. However, the unit is rigid enough so that cutters 5/16 inch in diameter can be operated to their full capacity in steel. The copy or templet is always flat, but curvatures can be obtained on the work by the use of special forming guides when desired. The use of a forming guide changes the area that can be covered at any given reduction by the cutter. Only uniform curvatures are amenable to engraving on this machine, which is designed especially for twodimensional work.

However, in addition to this and heavier two-dimensional pantographic machines, the same company makes some highly efficient and accurate three - dimensional units. They are called "three-dimensional" machines because they have facilities for copying with reference to depth, as well as to length and width, true to any given reduction for which they are set. For

that reason, they can be used for all kinds of model reproduction. These machines can be used for ordinary engraving work, or they can be fitted with a forming guide arm so that even-depth engraving can be performed on concave, convex or spherical surfaces contained within a diameter of 3½ to 4 inches.

When it is desired to do model work of any kind, the forming guide arm is removed from the machine and a modelling bar is mounted instead. The modelling bar is a three-unit assembly which connects the tracer spindle and the cutter spindle in such manner as to reproduce depth variations from a model used as a master. The modelling bar consists of the bar proper, a yoke casting, and ball bearing rollers. It directly transmits various vertical movements of the tracer spindle in such manner that the cutter reproduces them at the scale which has been chosen in advance.

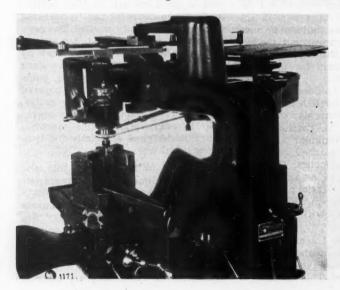
The use of a forming guide contemplates a method of making the cutter exactly follow the rounding contour

(whether concave, convex or spherical) of a piece of work, even though the master used is perfectly flat. In order to do this, the cutter spindle of the machine is designed so that it can be operated with an endwise or floating movement, and can thus either be made operative or locked.

When the cutter spindle is released to float, and the top end of the machine spindle has been fitted with a former point corresponding in size and contour to the point of the cutter held in the lower end of the spindle, the spindle can be made to follow (with reference to vertical motion) the contour of a forming guide held directly above the spindle on a forming guide arm, in a position directly and exactly above the work.

If that forming guide held above the spindle be exactly the reverse of the work curvature (if workpiece is convex the forming guide will be concave and vice versa), any truly vertical line imagined as existing from the surface of the former guide to the surface of the work will always be the same

length, regardless of the point at which it may be taken. In other words, the effective length of the spindle from extreme point of former-tip to cutter-tip being constant, and the for-



Profile Milling the refrigerator cylinders shown in the preceding illustration. This operation can easily be performed by an operator of average intelligence without previous experience.

> (Photo courtesy George Gorton Machine Co.)

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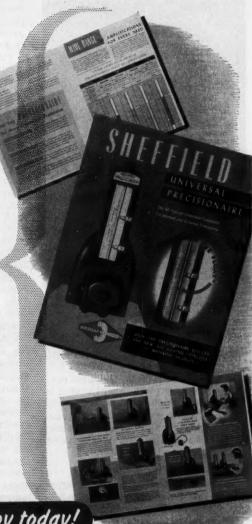
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Three jewelry hobs are shown here, together with the models from which they were made on a Gorton Three-Dimensional Engraving Machine. (Photo Caurlesy George Gorton Machine Co.)

mer-tip being always in contact with the former-guide above, and the former-guide being exactly the same contour as the workpiece except that it is in reverse, only one thing can happen. That is that an even depth of engraving cut will be maintained in the work, though the pantograph tracer point is moved over a flat master.

#### **Forming Guides**

The forming guide should preferably be made of a good grade of hardened tool steel. Before considering the steps involved in the making of a guide, it should be observed that for many simple concave and convex curvatures, it has been found advisable to use special adjustable forming guides, obtainable from the manufacturers of the engraving machines. The theory of the adjustable forming

guide is simply this. If an even-thickness, thin spring steel plate, with perfectly parallel edges, be held so that pressure can be exerted on two opposed edges (as between the jaws of a vise) the plate can be sprung into a curve, and the more pressure there is exerted, the shorter will the radius of the curve assumed by the thin spring steel plate become.

A special little fixture with one movable jaw has been devised for this purpose, designed to hold the spring steel plate in shallow grooves between the jaws. The movable jaw is provided with screws for adjustment so that the desired radii can be produced on the spring steel plate which is to function as a forming guide. Thus the radius of the plate can be directly adjusted to exactly suit and fit the contour of a given workpiece at hand, provided it falls within the scope of the device. Radii anywhere from 1% inch to a perfectly flat surface are possible, and such adjustable forming guides are used in either convex or concave style.

Where forming guides must be made, any of the regular machines in the shop that lend themselves to the process may be used. The lathe is outstanding for the purpose, of course, though in many cases the shaper can be used, and in instances where it seems advisable, such forms can be ground or even filed to final shape. If highly accurate depth uniformity on the work is desired, (which is usually the case), the forming guide should be perfectly matched with the part to be engraved, using mechanic's blue or lampblack to detect any mismatching. and scraping to fit.

In setting up, one attaches the forming guide to the forming bar by means of four small screws, then checks to see that the former point on the top of the spindle and the cutter point are approximately the same size, especially with reference to any small radius. Then the spindle floating movement is

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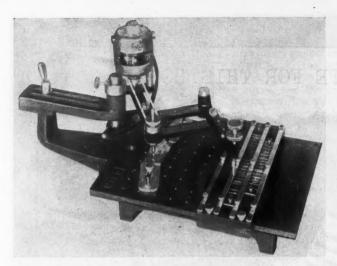
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THE CINCINNATI BICKFORD TOOL CO. Cincinnati 9. Ohio U.S.A.



The pantograph machine shown here, of unique and unconventional design, is adaptable to a wide range of routine production and experimental engraving. It is particularly useful on the many lettering tasks connected with experimental work, nameplates, and simi-

lar work.
(Photo Courtesy
Mico Instrument Co.)

temporarily locked until the workpiece is properly located on the machine worktable in relation to the master on the copy holder. When this has been done and both work and master are securely held in their respective positions, the operator is ready to locate the forming guide in relation to the work. This must be done with great care.

The spindle floating movement is now released, allowing the forming point above to come into direct contact with the forming guide. The spindle is spring-loaded in such manner that the point will always be held in contact with the guide while the floating movement of the spindle is released. A cutter blank with a conical point is placed in the cutter spindle, and the work is raised to a point very close to the cutter blank. Now, by moving the stylus over the master copy, the point of the cutter blank will be moved over the work and one can see (since it is adjusted very close to the surface) whether it follows the curved surface of the work faithfully. If not, the worktable must be moved in the necessary direction, until work and former guide have been brought into perfect register.

This process will in most cases cause the master of the copy to be somewhat out of proper alignment with the work, due to the fact that it was necessary to move the worktable. Therefore in many cases the master will have to be re-located. To do this, the copy has to move to be shifted back and forth. positioning the stylus at extreme points of the copy and noticing when the cutter point locates laterally with the work. When this correction has been made, everything is in order; the table should be locked firmly and not moved again. Before beginning the operation, the forming guide should be well covered with grease so that the forming point will slide over the curved surface without unnecessary friction.

"Your Production Problems" is the title of an eight-page brochure released by Hydraulic Machinery, Inc., 12825 Ford Rd., Dearborn, Mich., outlining this firm's greatly expanded facilities. The brochure describes the engineering, laboratory, and production departments of the company and illustrates typical special and hydraulic machinery in addition to test equipment and hydraulic power units. Copy free upon request.

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Left: Outer support table provides guide for broach rear pilot and automatic support lack for broach shank. Eliminates manual hand ling of broaching tool. Ball bearings on slide reduce wear and facilitate movement.



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The wax used in the precision casting, or "lost wax," process is carefully blended from the raw materials and then is molded in blocks.

By

W. O. SWEENY

Sales Engineer, Haynes Stellite Company

# The "Lost Wax" Process of Precision Casting

HE ability to produce certain types of metal pieces by casting, within reasonably close limits of accuracy and with reasonably smooth surfaces, has long been a need in metal manufacturing. Among the methods that have been tried is that of using a wax pattern, building up the mold around this pattern, and then melting the wax, thus leaving a perfect mold cavity into which the molten metal is poured or forced to form the casting. Because of the manner in which the wax is eliminated after the mold has beenbuilt around it, the procedure is called the "lost wax" process.

The "lost wax" process of casting is not new; in fact, records exist which indicate that this process was used by artisans in gold and silver several centuries ago. However, the process was practically forgotten until some 30 or 40 years ago, when it was adopted by dental technicians for making fillings and plates. More recently intense research on the process has resulted in the development of a practical method for producing high-grade work within commercial cost limits.

The Haynes Stellite Company, Kokomo, Indiana, has set up a special division for the development of the lost wax process of precision casting, and has been successful in reducing the process to a production basis, An outline of the Haynes method of proced-

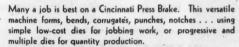


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From the customer's blueprint of the part to be produced a "master pattern" is fabricated from bross, steel, Hayses Stellite alloy, wood, or other material, depending on the design of the part. The master pattern is a replica of the desired piece made slightly oversize to allow for shrinkage. When the pattern has been made, it is carefully checked against the blueprint to be sure that it is dimensionally accurate.

ure is presented here.

The first step in the process is the preparation of one or more master patterns which are replicas of the parts to be produced, except that the patterns are oversize by approximatelly 1½ per cent. This oversize allowance is to compensate for wax and metal shrinkage. From the master pattern a soft metal die is cast in which there are from one to 20 cavities depending upon the size of the part. An effort is made to get as many pieces into the die as is practical, since, by increasing the number of cavities, the number of wax patterns produced

with each injection of wax is increased accordingly. However, for extremely simple shapes, dies can be machined from aluminum or a similar material and the preparation of the master pattern can be eliminated.

With the dies completed, wax is injected into the dies, forming replicas, in wax, of the master pattern. Several of the wax patterns are mounted on a main gate and connected by wax runners. This wax assembly is then covered with a powder which will later become the mold facing, to assure a smooth surface on the finished casting.

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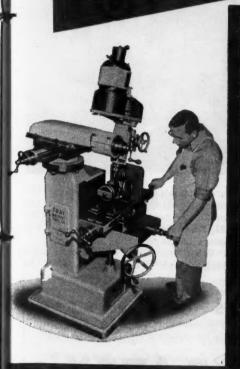
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ed in a metal mold case and the case is filled with a carefully-mixed and aged mold material consisting of a chemically - hardening ethyl silicate mixture which is commonly referred to as "investment" material. The mold is vibrated and heated until the mixture "sets" and becomes a solid body surrounding the wax assembly. As completed, the mold consists of the wax pattern, (which is in the center), the powder facing around the wax pattern, and the solid investment materi-

al—all contained in the metal flask.

The molds are now allowed to age for several hours, then they are put in to the dewaxing ovens and the wax is melted out, leaving cavities in the centers of the molds which

The die-maker is preparing to pour the metal into the first half of the mold.



are duplicates, in size and shape, of the master pattern. In this process the molds are heated to from 1300 to 1900 degrees, depending upon the size and shape of the part that is to be cast.

When the molds have been heated long enough to assure that all of the

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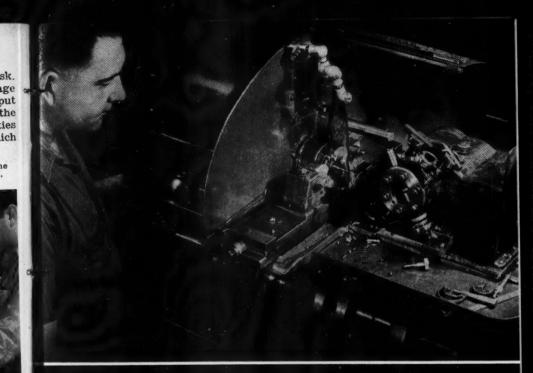
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wax has been melted away, each hot mold is clamped, in turn, over the mouth of a furnace in which an accurately-weighed charge of the desired alloy has been melted. Then the whole assembly is inverted and the molted metal is forced, under air pressure, into the cavities in the mold. (This ap-

Necessary cores are placed in the die and wax is injected into the die by means of a "gun" which is inserted in the die and emptied by a pneumatic ram.

plies to comparatively small parts; larger parts are usually cast by the conventional gravity-pour method). The filled molds are then cooled.

It should be noted here that correct mold and pouring temperatures make it possible to control grain size and

assure good metallurgical characteristics. The air pressure makes it possible to cast extremely thin edges and also helps to produce sound and dense castings.

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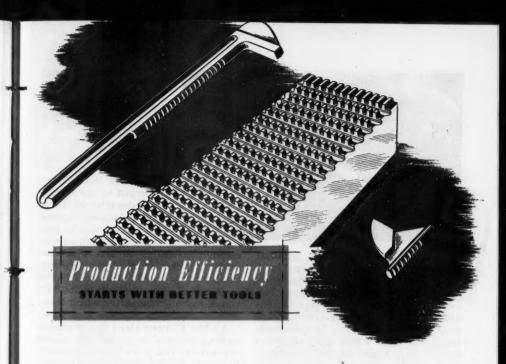
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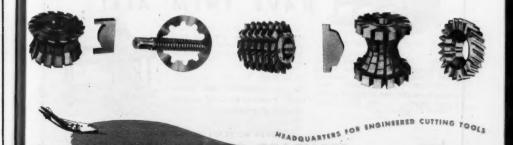
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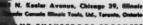
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The wax pattern is removed from the die and any cores that are used also are removed. The wax gate is manually broken off. These wax patterns are replicas of the master pattern.

mold. The excess investment material is removed and the cast assembly is moved to the point where the gates and risers are removed by cutting. The castings are then shot-blasted and inspected, after which the castings that pass inspection are sent to the grinding department where the gate areas are smoothed and surface irregularities are removed. The castings are

now sand blasted and returned to the inspection department to be checked for dimensions, following which they are subjected to a fluor-

escent penetrative oil test which reveals any cracks or other imperfections that may exist. The final test is an X-ray examination with a 250,000-volt X-ray machine, after which those that are sound are ready to be shipped.

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Operators are enthusiastic in their praise of this new direct reading speed control. They don't have to refer to index plates or retain lever positions in their minds when making speed changes. Its superiority and convenience encourages operators to use correct speeds for their work. Being direct reading, operators are not fearful of making mistakes.

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The entire range of 32 spindle speeds is secured through two opposed vertically operated

2 Control Levers and 1 Back Gear Lever



levers which are direct reading and one two-position back gear lever used only when changing from the high to the low speed range or vice versa.

This new speed control makes work easier; increases production because of it and the payroll dollar buys more as a consequence.

This and other fine features of the "American" Hole Wizard Radial Drill are thoroughly illustrated and described by Bulletin No. 326.

THE AMERICAN TOOL WORKS CO.

Cincinnati, Ohio, U. S. A.

Lathes and Radial Drills

## CERROSAFE

Makes Wood Patterns and

Core Boxes

## **LAST LONGER**

Cerrosafe, melting range—160°-190° F. can be sprayed on wood patterns and core boxes by means of an electrically heated spray-gun\*. This coating resists moisture, wear and prevents warpage. Simplifies alteration of patterns.

Cerrosafe, when cast or sprayed, reproduces fine detail. Used for making duplicate patterns and as master models for engraving machines with low stylus pressures.

\*Spray gun information sent on request.

#### OTHER LOW-TEMPERATURE-MELTING ALLOYS

CERROBASE

Melting Temp. 255° F.

CERROBEND

Melting Temp. 158° F.

CERROMATRIX

Melting Range 217° F.-440° F.

CERROTRU

Melting Temp. 281° F.

CERROLOW-117

Melting Temp. 117° F.

CERROLOW-136

Melting Temp. 136° F.

CERROSEAL

Melting Temp. 255° F.

Write for name of nearest distributor.

#### CERRO DE PASCO COPPER CORPORATION

40 Wall St.

New York 5, New York



This operator is mounting two wax patterns on a main gate with wax runners.

including the wax and investment materials, are chemically analyzed or physically tested, and must meet rigid specifications. The wax pattern rooms are air-conditioned and dust-free. Potentiometers and optical pyrometers are used to check furnace and molten metal temperatures. Each heat of me-

The assembly is dipped in a very fine silica suspended in a suitable medium. The presence of this fine material next to the wax is responsible for the smooth finish of the castings since, when the wax later is melted out, this is the surface on the inside of the mold which will be adjacent to the molten metal.



## Are you grinding Metal ... or Wheels?

A grinding wheel that wears out quickly is simply grinding itself away-instead of the material it's working on. It's not tough enough, not built right for the job .To avoid this let Bay State engineers specify the right type and size for each job.

Then you'll get wheels that grind fast, cool and true throughout a long, hard-working service life. Their extra-strong bonds hold each abrasive particle until it has done maximum cutting duty. Their "controlled porosity" strengthens wheelstructure by uniform-spacing of the grains. Their "fractional grading" (three degrees of hardness within the usual single grade) triples the usual hardness range and enables closer duplication of original specifications.

There's a Bay State Wheel for every grinding operation, from fine precision work to heaviest snagging. Use the types and sizes recommended by Bay State and forget your grinding worries because the efficient, economical results you get from your first wheel will be exactly repeated with every reorder. Write for full information on your particular requirements.

#### BAY STATE ABRASIVE PRODUCTS CO.

8 Union Street, Westboro, Mass.

Canadian Plant, Brentford, Ontario





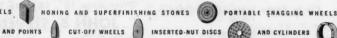
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GRINDING WHEELS HONING AND SUPERFINISHING STONES PORTABLE SNAGGING WHEELS





The ''stuccoed'' assembly is carried through a dehumidifying tunnel by the conveyor belt. This drying process takes 22 minutes.

tal and, where necessary, a sample from each mold is subjected to physical tests to assure adherance to specifications. Equipment is available for stress-rupture and hot-tensile testing.

At the present time Haynes technicians do not feel that it is practical to attempt jobs calling for tolerances closer than plus or minus 0.003 inch, and in general they prefer to have a latitude of plus or minus 0.005 inch. Perhaps the fullest advantage can be taken of the process by casting pro-

files to size and finishing bearing surfaces or other close tolerances by machining.

Currently the largest part made in this plant is the propeller hub for the "Ercoupe," which weighs approximately three pounds. In mass production the heaviest item made thus far is the Pratt & Whitney coupling, which

When the wax assembly reaches the end of the conveyor belt after passing through the dehumidifying tunnel, a flask of Hastelloy alloy C is sealed to the steel plate with wax to make sure it is liquid tight. The flask is in a wax paper roll that is longer than the flask to hold the surplus investment material that later is cut off.





7½ in. Rotary Table for Small Miller Tables

Send for circular.

# STEVENS ROTARY TABLE

Table graduated for single degree reading. Worm can be disengaged for turning table by hand.

Other sizes 12", 18" and 24" diameters.

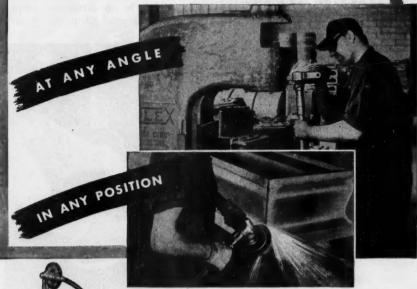
#### JOHN B. STEVENS INC.

482 CANAL ST.

NEW YORK 13, N. Y.

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# FASTER FINISHING





# FLEXIBLE SHAFT

Regardless of the angle or position of the work, a Mall Flexible Shaft Grinder handles every finishing job with speed and efficiency. Its constant high wheel speed, extra power and stamina accelerate Grinding, Sanding, Wire Brushing, Polishing and Buffing. Its caster base mounting and tilting swiveling motor make power available in any

position. The flexible shaft allows the operator to use the interchangeable working tools at any angle. This complete flexibility-combined with its broad range of applications and high over-all efficiency-makes the Mall Flexible Shaft Grinder the most profitable tool any factory could own.

Ask your Supplier for Mall Flexible Shaft Grinders or write direct for literature and prices.

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7814 South Chicago Avenue

Chicago 19, Illinois

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# BUTTERFIELD THRED-RITE DIES

The modern adjustable collet die at its best.

Engineered to meet the demand for screw thread parts production on high speed equipment.



These dies can be used not only in our own Floating and Releasing Type Holders but also in any Holder designed for dies of this type.

For accuracy, speed and long life specify Thred-Rite.

### UNION TWIST DRILL CO. BUTTERFIELD DIVISION

Factories: Derby Line, Vermont, U. S. A. Athol, Mass.; Mansfield, Mass.; Rock Island, Quebec, Can.

#### STORES:

Cleveland										2	5	20	2	E	ucild	A	ve.
Chicago			 							1	١	1	5.	1	Clinto	m	51.
Detroit						5	1	5	2	7		W	00	d	ward	A	ve.
New York	٤.												. 6	1	Read	le	51.

weighs approximately 11/3 pounds. However, the process is gradually being extended to heavier castings and it is anticipated that in the near future the plant will be handling work that will weigh three to five pounds.

By conventional gravity-pour methods there is no furnace weight limitation. There is no minimum weight, within reason, and a number of parts



The flask containing the wax assembly is carried by means of a hanger-conveyor to the next department, where it is filled with a chemically-hardening investment material.

have been made which weigh only 0.002 pound, or 500 pieces to the pound. Likewise there is no current limitation on minimum size, within reason, and work is being cast with edges as thin as 0.012 to 0.015 inch in production. The current maximum dimension is approximately seven to eight inches in any one direction.

Examples of the wide range of parts that have been made in the past few

months include:

The advantages of Steel-Weld Fabrication are well known throughout industry today. Mahon design engineers, and the skill and superior workmanship of Mahon craftsmen, are your assurance that all of the advantages of Steel-Weld Fabrication will go into your product.

Address, STEEL-WELD DIVISION

THE R. C. MAHON COMPANY

Engineers and Fabricators of Welded Steel Machine Bases and Frames, and Many Other Welded Steel Products

May, 1946

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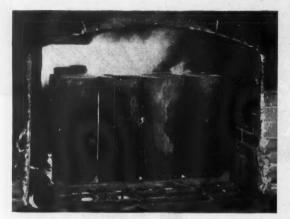
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1946

MODERN MACHINE SHOP 153



1. Reciprocating slides for cloth cutting machines, made from Haynes Stellite No. 6 metal. These slides outlast the tool steel slides formerly used by three to one. When the part was machined from bar stock, 42 machining operations, a heat treatment and

As the molds progress through the hotter zones of the furnace during the heating cycle of several hours, the wax is burned out. The molds are heated from 1300 to 1900 deg., depending on the part being preduced.

four grinding operations were required. The precision cast part requires only four grinding operations.

2. Fuel parts for aviation carbureters. These parts are made of Haynes Stellite J-Metal and could not be produced either

practically or economically unless they were precision cast.

3. Horseshoe caulks made from 12 per cent chrome steel for racing horseshoes. These parts are precision cast at a very low cost as compared to the cost of manufacture by other methods.

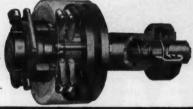


### PUT A WATCH DOG ON YOUR OIL BARREL

You can eliminate many unnecessary trips by your men to the Oil Barrel for lubricant, if you use MULE-PULL CLUTCHES. Unlike other types they have an ANTI-FRICTION, ROLLER-LEVERAGE SYSTEM that requires no lubrication whatever. The Loose-Pulley Sleeves of these Clutches have ECONOMICAL RING-OILING LUBRICATION that is copious without waste and proportional to the speed. One application of oil lasts from 30 to 90 days and you are protected

at all times against scored Shafting and ground-out Loose-Pulley Sleeves, together with the costly shutdowns that accompany such failures.



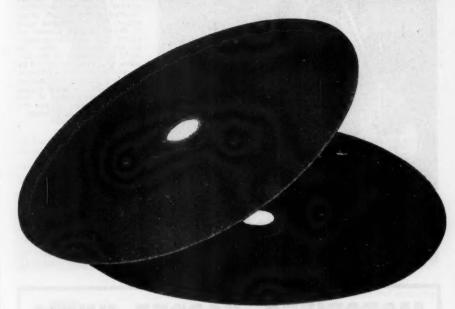


### **BROWN ENGINEERING CO.**

120 NORTH 3RD ST.

READING, PENNA.

# SPEED-WET and RESINIZED



# TWO NEW METALITE DISCS

Announcing—for immediate release—two new RESIN-TYPE Metalite Fibre Discs—developed under war-time research for accelerated peace-time production.

SPEED-WET METALITE—green backing—extra heavy duty with extreme flexibility.

RESINIZED METALITE—brown backing—heavy duty, all purpose.

Combining the heat and humidity resistance of the Behr-Manning Durabonded process with the extra toughness and stamina of the resin treatment, Speed-wet and Resinized Metalite Fibre Discs are truly masterpieces of research in postwar disc manufacture. Production improvement, demonstrated in extensive field tests against first grade discs, averages 50 to 100%.

For increased production yield, you are urged to test these new discs on all portable disc grinding jobs at once. Instruct your distributor to include a test quantity of Speedwet and Resinized Metalite Fibre Discs with your next order.



BEHR-MANNING • TROY, N.Y.

MANUFACTURERS OF QUALITY COATED ABRASIVES SINCE 1872

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MODERN MACHINE SHOP



4. Zipper slides and squirrel cages, made, respectively, from Hastelloy alloy C and 18-8 stainless steel. Both of these parts are cast to size and are When the metal reaches the correct temperature, as checked by means of an optical pyrometer to ensure proper grain size and other desired metallurgical properties, the hot, baked moid is inverted and placed directly over the pouring spout of the furnace. After the mold is clamped on the furnace, the metal is poured by inverting the entire furnace, and air pressure is turned on. The air pressure makes possible the casting of thin edges and also makes the metal sound and dense.

cheaper and more practically made than by other processes.

5. Claws for moving picture projectors made

from Haynes Stellite J-Metal. The cost of a part like this when precision cast, even when made from Haynes Stellite alloy, is only 5c each in large amounts.

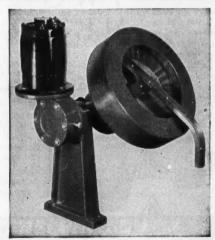
## **MOTORIZED HOPPER UNITS**

ADAPTABLE TO ANY MACHINE.

FEED BULLET CORES, SCREWS, PINS, WASHERS, BEARING ROLLERS, NUTS, RIVET, SPECIAL PARTS.

Send Samples for Information and Prices.

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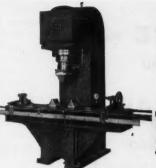


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75 ton forcing press, with sensitive pressure control.



100 ton straightening press with long table and center type fixture.



10 ton 2-column assembly press, with sensitive pressure control.

# HANNIFIN HYDRAULIC PRESSES



75 ton 4-column platen press with sensitive pressure control.

These presses are but a few of the standard and special types developed by Hannifin designers.

Straightening Presses—available from 6 to 150 tons with choice of table lengths and work holding fixtures for work that is centered or for round pieces.

Forcing Presses—from 6 to 150 tons, varying controls, stroke, gap and table construction.

Column Presses—2 or 4 column up to 150 tons, standard and special designs adapted to a great variety of production work.

Their design provides all the advantages of standardized construction, with welded frames and bases, precision hydraulic cylinders, built-in hydraulic power, perfected controls, and provision for simple installation. Flexibility to meet individual needs is readily available, as table construction, column spacing, speeds and controls, and ram stroke can be readily modified. Write for press bulletins.

Hannifin Manufacturing Company, 621-631 South Kolmar Avenue, Chicago 24, Illinois.

# Promote -

Production and Precision with

## NICHOLSON Expanding MANDRELS



#### TYPE A-STEP JAW DESIGN

Especially adapted for holding work with short bores while being machined between centers on lathes, grinders, millers, shapors, etc.

Size No.	Range of Bores Taken	Length Overall
1A	1/2" to 1"	9"
2Ā	1" to 11/4"	11"
3A	1 1/2" to 2"	1244"
4A	2" to 3"	201/2"
5A	3" to 4"	21"



TYPE B—STRAIGHT JAW DESIGN
Adapted for work with both short and long

bores .

Size No.	Range of Bores Taken	Length Overall
1X 2X 3X 00	1/2" to 18"	5"
2X	9 " 1- 21 /22"	6"
3X	21/32" to 44"	6"
00	21/32" to 4" 4" to %"	814"
0	7/s" to 1"	81/4"
1	1" to 114"	9"
2	14" to 14"	11%"
3	1 n to 2"	13%"
4	2" to 21/2"	1714"

Other sizes taking up to 7" bores. Set of 19 Nicholson expanding mandrels does work of 209 solid arbors. Sold singly or in sets. Bulletin 1043.

W. H. NICHOLSON & CO.

6. Canning machine parts, made from Haynes Stellite J-Metal. These parts are economically made by the precision casting process and the can machine company has ordered an additional 25 parts for machines now under construction.

7. Parts for Diesel engines, including pre-combustion cups which are made from Hastelloy alloy C. The parts are cast so that a minimum of finish is required. The alloy performs



The mold is allowed to cool slowly, and after about four hours the entire casting assembly is knocked from the mold by a pneumatic hammer. The excess investment material is removed and the cast assembly is carried by conveyors for removal of gates and risers.

remarkably well at elevated temperatures.

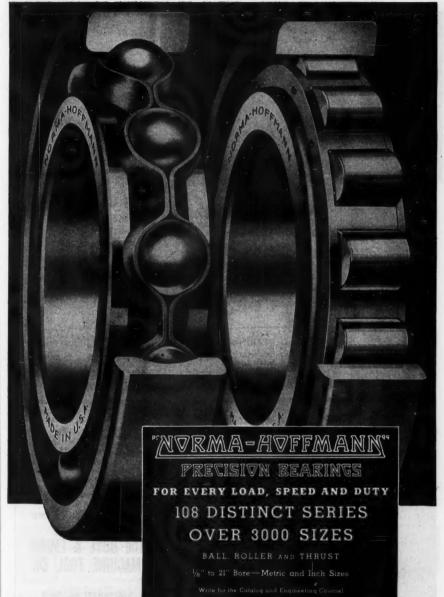
8. Cut-off neck rings for glass molds. Precision cast from Hastelloy alloy C, the rings have shown remarkable resistance to molten glass.

9. Parts for pulverizing equipment. Made from Haynes Stellite J-Metal, the use of the precision casting method permits the use of abrasion-resist-

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May.



NORMA-HOFFMANN BEARINGS CORPORATION, STAMFORD, CONN., U.S.A.

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The inside areas are touched up as needed with an internal grinder.

ble of which is the Pratt & Whitney exhaust coupling. Approximately 150 per day are now being produced from Type 347 stain. less steel. Jet nozzle parts are precision cast from Haynes Stellite No. 21 alloy and Hastelloy alloy C. These parts were formerly made from sheet metal and were unsatisfactory due to the fact that only a lower grade of alloy could

readily be fabricated and also because parts made from sheet metal tended to warp, buckle and crack when subjected to wide temperature ranges. Also it was impossible to obtain, economic-

ant alloys, cast to size, so that no finishing operations are required.

10. Aircraft engine parts, A number of these have been produced by the precision-cast process, the most nota-

## Consider

#### ALL GEARING IN THE LOWER HALF OF THE HEADSTOCK.

The headstock casting is of very heavy section, well ribbed. The back gears in front of headstock act as counterbalance for the spindle eliminating whipping action.

#### GEARED HEAD ENGINE LATHES 14" to 36" BOYÉ & EMMES

Birmingham. . Pratt & Whitney Co. Boston . . . . Pratt & Whitney Co. Butte . Sullivan Valve & Eng. Co. Charleston, W. Va.,

McJunkin Supply Co., Inc. Chicago, P. P. Wagener, Wilmette Cincinnati... Pratt & Whitney Co. Cleveland... Wm. K. Stamets Co. Detroit. D. E. Morand Mchy. Co. Duluth... W. P. & R. S. Mars Co.

Grand Rapids...Joseph Monahan Hartford....Pratt & Whitney Co. Houston...Huge-Fayle Supply Co. Los Angeles......Jack Brewer Melbourne, Fla....William Rath Melbourne, Fla. Milwaukee . . . Nichol Mchy. Co. New Orleans. . Patrick H. Dillon New York. Pratt & Whitney Co. Philad'p'a Pratt & Whitney Co. Pittsburgh. . Rees Machinery Co.

Richmond, Va.....D. B. Parker Rochester. . Pratt & Whitney Co. San Francisco, Schellenbach Mch. & Tool Co.

Seattle, Buckner-Weatherby Co., Inc. St. Louis. Pratt & Whitney Co. Toledo.,..Wm, K. Stamets Co. Canadian Rep., Moore Bros. Mach'y Co., Ltd., Montreal



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## ALVORD-POLK CUTTING TOOLS



# REAMERS MILLING CUTTERS END MILLS

Send blueprints for wire or phone quotation. Specials delivered to meet your needs. Standards from stock.

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ally, the desired design when fabricated from sheet.

11. Parts for rayon machines, made from Hastelloy alloy C. The only machining operation required is polishing, and it is much easier to polish investment castings than ordinary sand castings. Ease in hand polishing or electro polishing makes the precision



All castings are sand blasted to provide as nearly a perfect surface as possible. This particular part is both shot blasted and sand blasted.

cast method attractive to the food and dairy industries.

12. Parts for chemical equipment, made from the various Hastelloy alloys.

From the examples presented here it can readily be seen that the precision-cast method of manufacture is adaptable to a wide variety of work, for a wide variety of industries. It is obvious that the process is advantageous for shapes which are difficult to

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THE MOST FOR YOUR MONEY IN METAL-CUTTING



Completely
Automatic—Constant
Mesh, 4 Speed Transmission—
Angular Cutting Without Moving
Stock—Self Aligning Saw Frame—
6 x 6 or 10 x 10 Capacities.

Write for Details.

MAQUOKETA COMPANY

Maquoketa, Iowa

May, 1946

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MODERN MACHINE SHOP



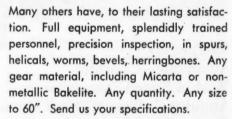
Trays of castings are passed through automatic X-ray equipment for the final check on quality.

machine, fabricate, form, or forge, or for alloys which are difficult to grind, form or forge. It should not be assumed, however, that the process is intended to compete with conventional screw machine operations. Naturally, many problems have arisen in adapting the process to the hundreds of jobs of thousandlot size which would not arise on jobs in million-lot quantities. To assure expeditious and intelligent handling, every new

job is "pre-engineered" before it goes to the plant. A group composed of production, engineering and sales representatives works out a tentative plan for production, then the plansheet follows the job through each pro-

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Send us your blueprints or gear samples for our quotations and delivery dates.





# A TOOL HOLDER WITH VERTICAL ADJUSTMENT

# .. FOR USING BORING TOOLS IN LATHES

A simple, quick turn of a knurled screw moves tool in vertical plane for precision setting. Use of shims is eliminated. Positive locking device.

Screw has Acme thread, hardened and ground. All parts made of alloy, steel, heat treated.

TWO SIZES: 1/2 x 11/4 and 3/8 x 1

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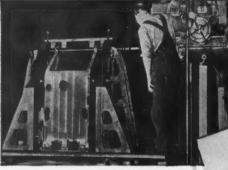


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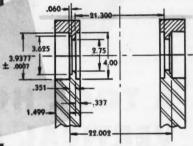
SINGLE POINT BORING TOOLS-INTERNAL THREADING, BOTTOMING AND FACING TOOLS-CARBIDE TIPPED TOOLS

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A Giddings & Lewis borizontal boring machine equipped with a Davis block type line boring bar. Micrometer adjustable cutters make all operations both rapid and simple to perform.

## Boring Operations



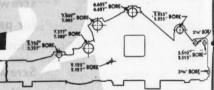
Drawing of trunnion bearings showing detailed operations. All measurements are made through micrometer block adjustment.

Drawing of shovel turn table with bore diameters shown.



This is a 5" Davis boring bar having micrometer adjustable black cutters. The line har is used on a G. G. L. machine to bore and face shovel turutable bearings.

Photographs through the courtery of Douly Machine Specialters, Inc., Chicago, Ill.





\*G. & L. Table Type Machine



G. & L. Floor Type Machine



G. & L. Planer Type Machine



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G. & L. Multiple Head Type Machine

GIDDINGS & LEWIS MACHINE TOOL CO.

# Speeded...with

## **DAVIS Block Type Line Boring Bars**

# Typical Line Boring Jobs with DAVIS Bars...

Two illustrations show how Davis line boring bars and block type cutters are used on Giddings & Lewis machines to speed production. Bore size and bore alignment are maintained to specifications.

#### EXAMPLE 1

Shows trunnion bearings being finished on a G. & L. machine. Through simple adjustment of the cutter blocks, bearings are bored, counterbored and backfaced without difficulty. A second operation bores and counterbores a tube through the workpiece.

#### EXAMPLE 2

Illustrates the use of a 5" Davis block type line bar with micrometer adjustable blocks. Here, shovel turntable bearings are bored on a Giddings & Lewis horizontal boring machine. Formerly, single point boring tools were used to bore and face these bearings. Now, Davis interchangeable, adjustable blocks are used with a bar aligning faxture. This method of boring cuts machining time from 90 to 24 hours.



Line boring operations are performed faster and more accurately on horizontal boring machines when Davis Block Type Line Boring Bars are used. These advantages are obtained through the simple manner in which Davis block cutters are adjusted and accurately set to hole size. The wide working range of the block with cutter combined with interchangeability of blocks and cutters simplifies and speeds all rough, semi-finish and finish boring operations. When holes must be counterbored, faced, grooved, undercut or chamfered, line bars with micrometer adjustable blocks make these operations extremely easy.

#### Davis Block Type Line Bars Increase Boring Output

If you are using conventional single point cutters in your line boring bars, you will find that Davis micrometer adjustable blocks in Davis bars will produce more holes in less time and at less cost. This is made possible by the easy manner in which blocks and cutters can be adjusted for hole size and the simple means of changing cutters when dull. Ask Davis engineers now how you may obtain better boring production on your horizontal boring machine. There is no obligation for this service.

## Descriptive Information FREE

Learn how Davis Boring Tools will solve your boring problems. Bar and cutter recommendations will be made for all boring operations. Kindly send print or authors were needs.

146 Doty Street . Fond du Lac. Wis.



Trained operators check all X-ray negatives closely for flaws that would make the part unsuitable for use.

duction department and any changes in procedure are noted on it. Upon completion of the job the sheet is filed for future reference.

The precision casting process has opened up a new era for the design engineer, in that he may now use alloys which previously were not available because they could not readily be made into the desired shapes. Furthermore, he is not limited now to designs which can be made only by conventional methods, since precision casting has opened up a way to the making of intricate contours and shapes that heretofore were not practical on a production basis out of any alloy.

For example, in the steam turbine field the design engineer has been limited to shapes and to alloys which could readily be milled or extruded. Now he can design for maximum efficiency; he can put in all the angles he wishes and can use a super alloy

for the higher temperatures and pressures because the part can be cast by the precision method. Revolutionary developments can be expected in the design of all kinds of machinery and machine parts as designers become aware of the potentialities of this new mass production process.

"Silence Your Screw Machine Department" is the title of a four-page circular issued by the Corlett-Turner Co., 4011 W. Lake St., Chicago 24, Ill., illustrating and describing the use of C-T Silent Stock Tubes in connection with turret lathes and single and multiple-spindle screw machines. Copy free upon request.

## ... for more than 1001 odd jobs



The Hjorth Bench Lathe has the speed, accuracy, handling ease, and dependability that appeads to every operator. That's why you'll find the better shops equipping with the Hjorth Lathe.

WRITE TODAY FOR DATA AND PRICES.

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# USE RUBBER-CUSHIONED Brightboy

Offset PRODUCTION COSTS MOUNTING PRODUCTION COSTS

W ITH rubber-cushioned Brightboy, work-and-timesavings are achieved by simultaneous, one-operation BURRING, FINISHING and POLISHING. Three Brightboy

Textures: Standard, Fine-Tex and Tuff-Tex give wide work-adaptability . . . bridge the gap between the grind and the buff.

Ask your dealer for the new Brightboy catalog, prices and applications data; ask the Brightboy service man for production short-cut suggestions.

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That
Unseen
Extra
Quality



## A Golf Champ Has It— A Republic Gage Has It—



You can't see "THAT UNSEEN EXTRA QUALITY" but it is there; — in each gage, driving "the cost per hole gaged" to a new low.

More and more, men who know are turning to Republic Gage Company to supply their gaging needs.

See what they'll do for you.

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## Induction Heating, II

### Surface Hardening Technique—Design of Heating Coils— Progressive Hardening

By GILBERT C. CLOSE

THOUGH high frequency induction heating technique has invaded practically all phases of heat treatment, use of the process for surface hardening operations overshadows in importance any other single use. Sur-

Fig. 10—Inductor and Spray Quench Ring for Hardening Gear Teeth. Auxiliary Tube is for Cooling Inductor During Heating. The Quenching Medium is Applied through Side Nipples. (Courtey Ohio Crankshaft Co.)

face hardening with the induction heater has met with outstanding success in all types of industry, and on parts ranging from small pins to the giant gears that are used on the heaviest types of industrial machinery. The precise control possible with this type of equipment and the rapidity with which parts may be processed contribute greatly to quality production and low production costs. ce

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Expansion on the advantages of high frequency heating for surface hardening operations will be indicative of its value in this conjunction. Summarized, the advantages are as follows:

- (a) Localized heat applications, and control of heat penetration.
  - (b) Lower production costs.
- (c) Elimination of warpage and straightening operations.
- (d) Elimination of surface scale and oxidation,
- (e) Elimination of post-hardening heat treatments.
  - (f) Increased production speed.
- In Part I of this article, localized heat application by the use of the induction heating coil was fully explained. It was noted that coil design, frequency and time were unit factors in determining the area of metal that would be heated and the depth to which the heat would penetrate. These control factors are of paramount importance in surface hardening operations.

For illustrative purposes, consider the problem of surface hardening the teeth on a spur gear. The heating coil

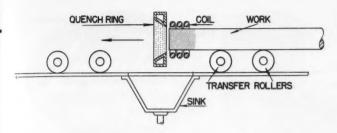


Fig. 11 — Diagram Illustrating Continuous Hardening Set-Up

is designed just large enough to receive the gear without establishing contact at any point, and wide enough to cover the entire face of the gear. When the current is turned on, the surfaces of the gear teeth are heated first, due both to the proximity of the surfaces to the coil windings, and to the surface effects of the induced alternating current.

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As the surface of each tooth becomes hotter, heat is forced deeper toward the tooth center section. By interrupting the heating cycle before the center of the tooth is reached, and by quenching before the center portions have time to heat by conduction,

a gear is produced with the teeth surface hardened to resist wear, but with the internal portions of both teeth and gear body retaining the ductility, strength and impact resistance of the original metal.

The same principles apply when surface hardening crankshaft be a ring journals, bushings, cutting tools, and similar pieces. The ability to confine

the hardening to only those portions of the surface that require it offers other ad-

vantages as well. Machining operations may be carried out on surfaces adjacent to those hardened after harddening has been completed. Different degrees of hardness can also be obtained within a single workpiece, such as a combination eccentric and gear where eccentric surfaces require a hardness substantially greater than that on the gear teeth.

A second great advantage of induction heating for surface hardening consists in lower production costs. Though the cost of low carbon steel alloys to be carburized is slightly less than the minimum 0.40 carbon steel required for induction hardening, this difference

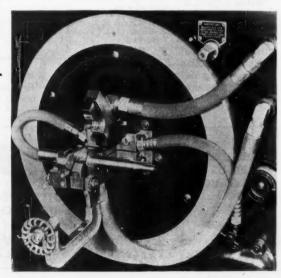


Fig. 12—Hinged Inductor Incorporating Spray Quench for Surface Hardening Crankshaft Bearing Journals

(Courtesy Ohio Crankshaft Co.)

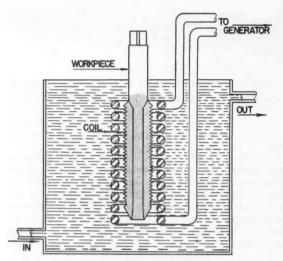


Fig. 13—Diagram Illustrating Arrangement of Equipment for Immersion Heating

burized is wasted energy. The ability of the induction heater to concentrate the heat energy where required results in a fuel saving amounting, in certain instances, to several hundred per cent.

The following table presents a representative cost analysis of the operation of carburizing a 1020 car-

bon steel gear as compared to surface hardening on SAE 1045 steel gear by the use of an induction heater:

is more than offset by eliminating the carburizing process, by lower heating costs, and by elimination of post-hard-

ening heat treatment and cleaning operations.

When a part is carburized, the temperature of the entire bulk must be raised to the proper point

for processing and held there for several hours. All heat applied to those portions of the part not intended to be car-

Cost and Operation Cost of steel	SAE 1020 (Carburized)	SAE 1045 (Induction)
Carburizing at .041/lb.	321	.ói
Cleaning Total cost	785	.45
Saving		44%

Due to the localized heat pattern and the fact that the major portion of the metal remains cold during induc-



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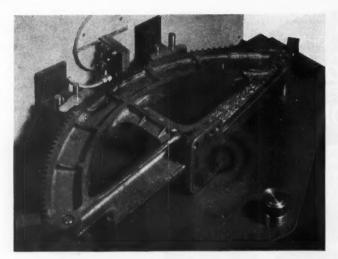


Fig. 14 — Fixture for Induction Heating and Hardening of Individual Teeth on Large Segment Gear (Courtesy Induction Heating Corporation)

encompass most of the metal, This does away with post-treatment straightening of parts, with resultant lower production costs and increased speed.

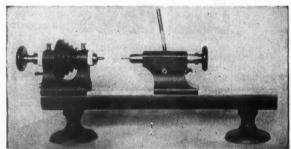
The rapidity of the induction

hardening process prevents to a practical extent the formation of scale and oxides on the surface of the treated part. This is distinctly advantageous

tion hardening, warpage is eliminated in most types of parts. The exception might be a thin ring gear or similar part where the heat pattern would

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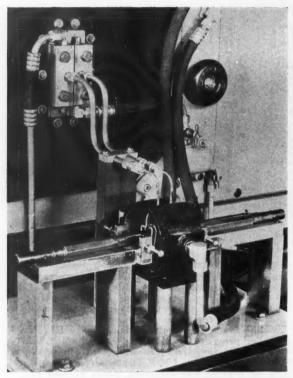


Fig. 15—Hardening Chipping Chisels at the Puget Sound Navy Yard. Production Rate, 500 Chisels per Hour

for several reasons. Post-treatment pickling and cleaning operations are unnecessary; closer tolerances are possible because no surface metal is lost. Gear teeth may be shaved prior to hardening, and most machined and finished surfaces will remain unaffected by the hardening treat-ment.

Because the interior of most induction hardened parts remains metallurgically unaffected during the process, post-treatment drawing is not necessary. This advantage, coupled with the speed at which parts are handled results in substantially lower production costs. When the time-heating cycle of an induction heater has been adjusted to the type of work involved, and when the cycle is controlled by automatic devices, an

inexperienced person can turn out precisely hardened parts in rapid sequence, usually within a matter of seconds.

As no carbon is added during the hardening process, steels to be hard-

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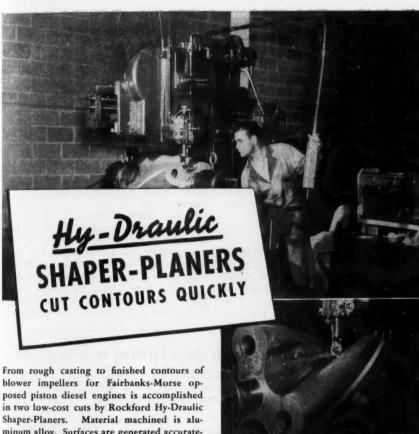
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ened by induction require a minimum 0.40 carbon content. If conventional furnace hardening equipment were to be used, 0.40 carbon steel might indicate rather low hardening qualities. During induction heating, however, the carbon is brought into solution at an extremely rapid rate, resulting in greater hardenability than is possible to accomplish with other methods. At the same time, the rapid heating and quenching made possible by the induction process results in a finer grain structure and metallurgically improved qualities. It is possible to obtain hardnesses ranging upward to 65 and 70 Rockwell "C" with 1040 carbon steel hardened by the induction process.

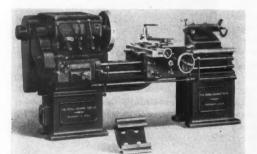
The equipment used for handling parts during induction hardening is almost as diverse as applications of the process itself. Provisions are made for convenient loading of the part into the heating coil, and for rapid quenching when the heating cycle is complete. In general, automatic time switches are employed for shutting off the current after a predetermined heating interval, and often the same automatic timing device operates a solenoid for tripping the part into the quenching medium at the moment the current is interrupted. When spray quenching is used, provisions are made for applying the spray as soon as the heating cycle is complete. Small parts, such as taps, dies, thread gauges, and so on are often heated while immersed in the quenching medium.

In continuous hardening operations, such as edge hardening a template, or surface hardening an axle shaft, the heating coil and quench ring are mounted side by side so that the work may move progressively through the coil and into the quenching area. Final arrangement of the processing equipment will depend upon the type

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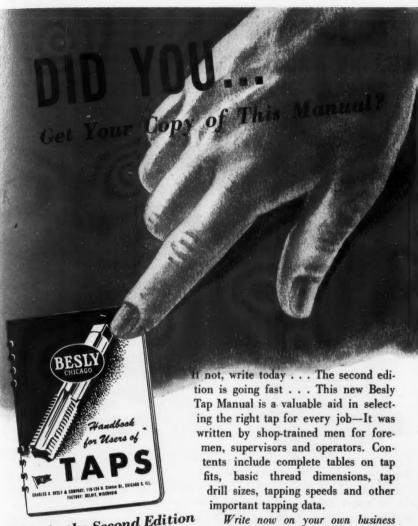
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and size of parts involved, upon the quenching medium (whether oil. water, or air), and coil design for receiving the parts in process. In many instances two identical work stations are provided, operated alternately by a throw switch, so that one station

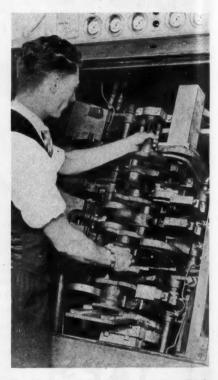


Fig. 16—Equipment for Hardening Four Crank-shaft Bearing Journal Surfaces Simultaneously (Courtesy Ohio Crankshaft Co.)

may be loaded while the work in the other is undergoing treatment.

No hard and fast rules can be laid down concerning heating coil design for hardening. In general, the coil must be shaped and stationed in a manner to produce the greatest concentration of magnetic flux in the areas to be heated. Certain problems



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will arise in this conjunction, especially when hardening irregular surfaces such as the teeth of a gear.

It is highly desirable that the center of each gear tooth remain metallurgically unaffected during the hardening process. When hardening gears of from 8 to 14 pitch, the heat pattern from truly circular heating coil will tend to follow the tooth surface, and the center of the tooth will be unaffected. When hardening gears of smaller pitch, there is a tendency for the entire tooth to become heated by rapid conduction.

Gears of large pitch are usually through-heated when a circular coil is employed. This is due to the difficulty and time involved in "throwing" heat energy into the metal near the root and between the teeth. This problem can be met by designing the coil to follow the outline configuration of the gear. When extremely large gears are involved, the best practice is to

harden one or two gear teeth at a time with a coil designed especially for that purpose

The time-cycle in induction hardening will depend upon coil design, the closeness of coil coupling, the depth of heating desired, and the frequency of the induction heating unit. As noted in Part I of this article, the tendency of induced heating currents to penetrate the metal decreases in proportion to increased frequency.

When deep heating of heavy parts is required, such as large gears, heavy-duty crankshaft bearing journals, and large shaft bearing surfaces, the lower frequencies delivered by motor-generator sets will suffice. When the parts are smaller, however, requiring less depth of hardening, frequencies of from 200 to 400 kc are indicated.

When using a 200 kc set delivering 20 to 30 kva output energy, the average heating cycle on a small or medium sized gear will be between 6 and



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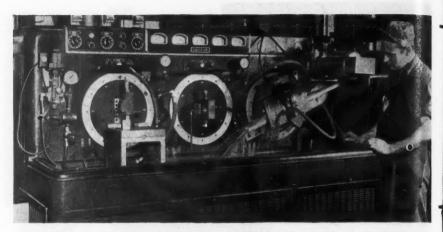


Fig. 17—Progressive Hardening Operation on a Gear Shift Fork Shaft at Caterpillar Tractor Plant (Courtesy Ohio Crankshaft Co.)

12 seconds. Quenching will consume approximately 5 seconds. Floor to floor time, including loading the gear and removing it after quenching will

vary between 20 and 40 seconds. This time interval will be substantially longer when special jigging of the part to be hardened is required.

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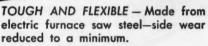
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Equipment for hardening crankshaft bearing journals, eccentric surfaces on camshafts, and similar parts. though retaining the automatic features, differs from that used for gear hardening. In most such applications a single heating coil is employed and the work is automatically transferred through the coil stopping at the portions to be hardened long enough to complete the heating cycle. When the area to be hardened is smaller in circumference than adjacent areas the heating coil will have to be of the hinged type, to allow it to be opened while the work is placed within,

Progressive or continuous hardening with the induction heater is finding many worthwhile applications in industry. When the area to be hardened requires the use of an unusually wide coil, such as for an entire axle surface, or when edge hardening is required on long strips or large sheets of metal, such as for an ice skate, progressive hardening is indicated.

One of the outstanding features of high frequency induction heating is its ability to transfer a large amount of heat energy in an extremely short interval of time, and into a relatively small portion of metal. This feature is very advantageous in continuous hardening operations.

A heating coil of one or two turns is constructed adjacent to a spray quench ring. No heating of the part in process occurs until it is placed within the coil. Once in the highly-concentrated flux pattern of the small coil, it is brought almost instantly to a high temperature. Passing the part quickly from the heating zone to the quench zone brings out the optimum hardenability qualities of the metal.

The degree to which the metal is heated is controlled by its speed through the coil. The principles of continuous heating are employed also for annealing of wire, flowing of tin plate, and other applications where

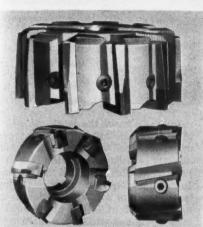
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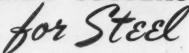
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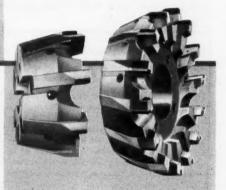


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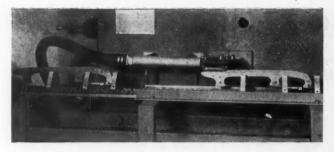


Fig. 18 — Conveyor, Coil and Quench Table for Hardening Running Edges of Ice-Skate Blades (Courtesy Induction Heating Corporation)

quenching is less even than that produced by immersion quenching.

In many cases the work table used in conjunction with induction hardening is provided with water or oil bath directly beneath the heating coil. The part in process is jigged in a manner to facilitate tripping it directly into the quenching medium as soon as the heating current is cut off. Tripping may be automatically-actuated by a solenoid installation, or may be accomplished by the operator. When oil hardening steels are used, the immer-

static conditions during heating would not be applicable.

The technique for quenching induction-hardened parts is very flexible, and quenching facilities may be incorporated in a manner to minimize delay between heating and cooling. Though spray rings are often used, either built in as a part of the heating coil or surrounding the heating coil, it is a known fact that the hardness produced in a surface by spray

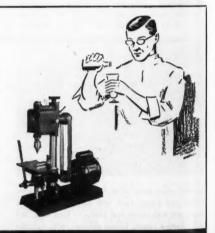
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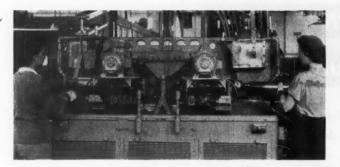


Fig. 19 — Hardening 106 MM Shell Cases after Forming. Equipment Includes Two Stations. The Process is Automatic except for Loading the Shell Cases into the Machine. Progressive Hardening is Accomplished During Ejection of the Case

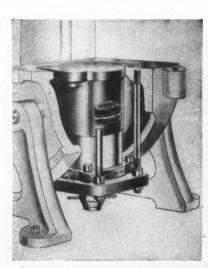
(Courtesy Norris Stamping Co.)

sion quench is the only practical method as spray quenching with oil obviously would present many problems.

A limited variety of parts can successfully be "air quenched" when heated by the induction process. This practice is not recommended, however, without thorough investigation prior to installation. Taking into consideration the size of the part and the

characteristics of the steel from which it is made, a careful selection of frequency and power supply is necessary. Furthermore, the part must be of sufficient mass to assure rapid dissipation of surface heat by conduction into the adjacent metal areas.

Using an air quench, surface temperatures of parts of this type will be reduced below any critical change point within a matter of 2 or 3 seconds.



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Highly localized heat patterns should be employed for this type of work, which in turn indicates use of a large output unit operated at frequencies of

approximately 1 megacycle.

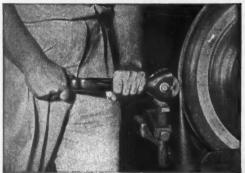
Induction hardening of many types of parts has removed a highly critical process from the heat treating department and has placed it on the production line where, with thoughtfully-designed fixtures, it assumes an almost automatic and fool-proof characteristic. Due to this factor, the number of rejected parts is minimized and quality production is greatly enhanced. The flexibility of the units permits quick interchangability for hardening different parts, or for utilization in brazing and other heating applications.

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"Tailoring in Metal," a 20-page engineering manual offered by The United Welding Co., Middletown, Ohio, discusses the factors affecting the choice of welded fabrication and the techniques of welded design. Various types of welds are explained, together with how they affect static and fatigue load values. Of particular interest to the designer is specific information concerning devices which can be employed to reduce cost and improve construction. The methods presented are profusely illustrated with drawings and photographs.

Although written primarily for manufacturers of machinery and equipment, the manual should be of interest to those involved in shop maintenance due to the application of welding to such fabrications as gear blanks, pulleys, tanks, casings, housings, frames, breechings, stacks, and so on. Copy free to plant executives upon request.

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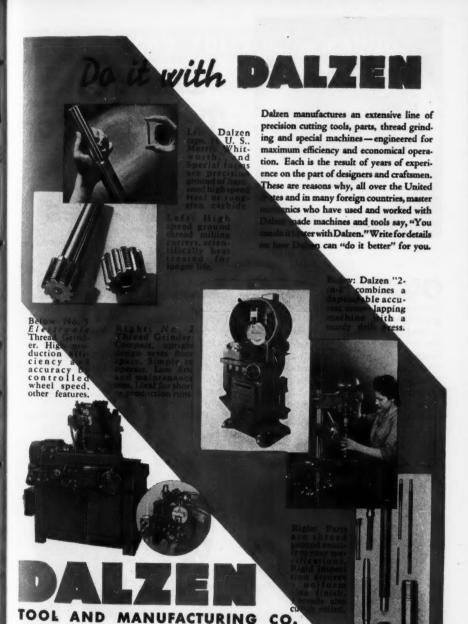


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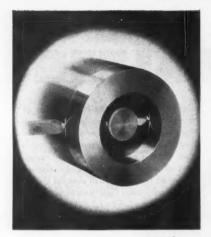
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# Diamond Tooling for Bearing Surfaces

By CHRISTOPHER H. BIERBAUM
Vice President, Lumen Bearing Company, Buffalo, N. Y.

of necessity, all bearing alloys are composed of hard and soft formations or crystals, and in order to properly tool the surfaces of bearings made from these alloys it is essential that the crystalline structure of these surfaces be distributed as little as possible. The hard, or bearing, crystals are naturally harder to cut than the softer matrix; therefore, for the highest possible results, an exceedingly sharp tool is essential and the final finishing

should be done by taking one or, if necessary, several very light cuts.

This point is illustrated by the two accompanying photo - micrographs, both having the same magnifications (100 diameters) and made upon the same piece of metal. The subject is a lead base babbitt; Lumen Bearing Company's "Cosmos," containing 76 per cent lead, 9 per cent tin, and 15 per cent antimony.

The surfaces, before photographing,



Fig. 1—Photomicrograph of Surface of Babbitt Bearing after Machining with Steel Tool (X100)

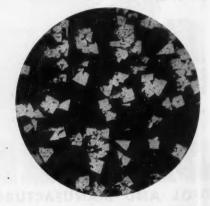


Fig. 2—Photomicrograph of Surface of Babbitt Bearing after Machining with Diamond (X100)

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WRITE FOR BULLETIN B2. were treated with a 10 per cent dilution of nitric acid, which darkens the matrix and leaves the hard antimony crystals perfectly bright. The photograph Fig. 1 was taken on a surface that had been machined with a steel tool (which had carefully been ground and honed) with a surface feed of 0.002 inch per revolution and with a minimum depth of cut. The last cut was taken after several preceding light ones. Figure 2 is a photomicrograph taken in a similar manner upon a surface that had been finished with an exceedingly sharp Gilmore diamond.

Comparing the two graphs, it is very apparent that in Fig. 1 nearly all of the hard crystals have either been chipped off or pulled out and the soft matrix smeared over practically the entire surface, leaving only a few bright spots. This condition indicates the presence of broken-up hard crystal. In Fig. 2 all of the hard bearing crystals are retained in their natural

position, the surfaces of the crystals being flush with the surface of the matrix metal and presenting a condition comparable with that of a "runin" bearing.

A bearing surface machined as shown in Fig. 2 obviates the necessity of running-in for the reason that the finished surface is a solid, even face of hard bearing crystals. On the other hand, before a surface such as that shown in Fig. 1 can be depended upon for satisfactory performance it must be worn down in service; that is, all of the surface metal that has been dragged, smeared or otherwise disturbed by the cutting tool must be removed by being worn off. The "running-in" operation is always a tedious and expensive procedure.

When employed under proper mechanical conditions, a diamond can be depended upon for the following advantages: (1) superhardness, (2) a homogeneous or flawless body capable



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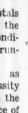
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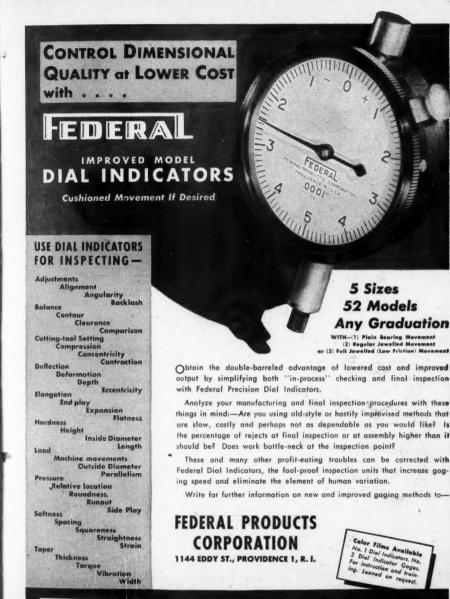
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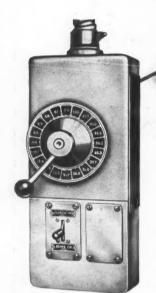
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of taking a high polish, and (3) an edge that can be polished or lapped to a degree of sharpness unobtainable with any other known substance. Thus the diamond can be polished to a sharper edge than any steel, regardless of the refinement of the steel, because the diamond is pure crystallized carbon in an ultimate state of orientation, whereas any metal consists of a

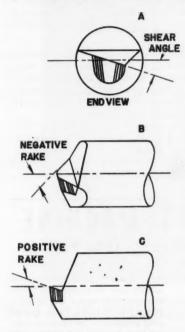


Fig. 3—(A) Correct Shear Angle will Decrease Cutting Pressure; Should be 7 Deg. for Bronze and about 12 Deg. for Aluminum. (B) When Possible to Use It, a Negative Rake Adds Life to the Cutting Edge. (C) The Positive Rake or Hook Should be Avoided Whenever Possible

combination of different crystals made up of an enormous number of molecules which, in turn, are composed of different atoms.

Of special importance, in machining with diamond tools, is the setting of the stone in its holder. Several methods of setting diamonds are in use by



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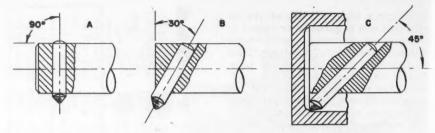


Fig. 4—(A) Most Common Type of Diamond Mounting; 90-Deg. Angle (B) If Clearance at End of Boring Bar is Necessary, Shank is Set at 30-Deg. Angle. (C) If a Square Corner is Specified at Bottom of Hole, Shank Must be Set at 45-Deg. Angle

various diamond tool manufacturers, but when properly set, a diamond-tometal contact is obtained which is free of oxidized inclusions and which is secure for the life of the tool.

It is good practice to set the diamond so that a shear angle is obtained, varying from approximately 7 per cent for cutting on bronze to about 12 per cent for working on aluminum. This shear angle decreases the cutting pres-

sure when taking a cut. In machining aluminum, the shear angle helps to produce a sliding effect on the chips and thus prevents the aluminum from coating or building up on the top of the diamond.

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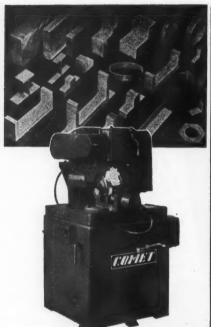
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mium, and is a practical form for all purposes. A positive rake or hook should be avoided whenever possible. Included angles under 90 degrees sometimes prove weak while obtuse angles make for sturdier edges. It should be remembered that although the diamond is hard, it is also brittle, and scientific setting is necessary for success.

In using a diamond tool, support should be provided as closely to the diamond as possible in order to obtain the necssary firmness. Another factor in the production of a high finish is the setting of the diamond so that a minimum of cutting clearance will be provided under the edge of the diamond.

Cutting clearances are important, In ordering new tools or repairs the purchaser should indicate the position of

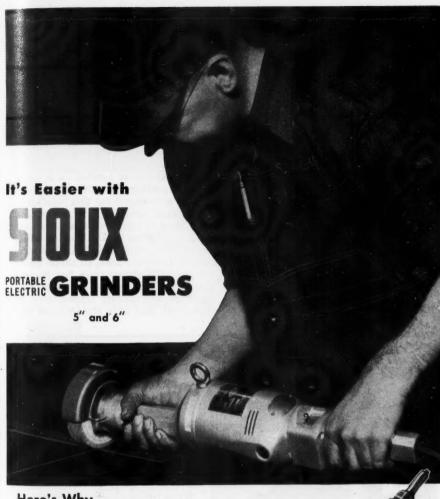


Fig. 5—Where the Diameter of the Hole is Small, the Diamond is Mounted in α Quill

the diamond in the bar relative to the work-surface. The most common type of mounting for a diamond boring tool is that in which the steel shank, carrying the diamond, is set at an angle of 90 degrees to the axis of the bar, but if clearance at the end of the boring bar is important, the shank is set at a 30-degree angle so that the cutting edge of the diamond will project beyond the end of the bar. Where it is necessary for the diamond to continue the boring operation to the bottom of the hole, perhaps to cut a square corner in the hole, the shank is set at an angle of 45 degrees with the diamond projecting past the end of the bar.

For diamond boring small bronze bearings and similar work where the diameter of the hole is too small to admit the usual type of boring bar, the ELE

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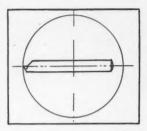
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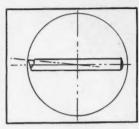


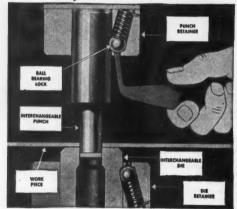
Fig. 6—(Left) If a Diamond Were Mounted in a SmallDiameter Shank on the Center Line, Insufficient Body would be Provided to Hold the Diamond Safely. (Right) Diamond Should Be Set Above Center Line as Shown Here. Top Face of Diamond is on Radial Line with Correct Cutting Clearance

diamond is mounted directly in a quill. Holes as small as ¼ inch are bored with diamonds as regular procedure, and on such small work the cutting clearance on the tip of the diamond is of prime importance. In setting diamonds in the smaller sizes of shanks the diamond is set above the center line of the shank to permit the use of as large a diamond as possible and also the ensure the maximum of support under the stone. However, the top face

of the diamond is located on a radial line, and cutting clearances are provided that are correct for this position.

Generally speaking, the bearings of a machine in which diamond tools are to be used must be adjusted to closer limits than is the practice when steel cutting tools are used. In shops where the use of diamond tools has become standard practice, the work spindle bearings are usually lapped-in to so close a fit that only the thinnest film

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Where small, loose products are used or produced, per-fecting the materials handling system is often the most important factor in attaining lower production cost. An essential part of the system is properly designed, light and strong metal shop containers for the pickup, collection, and conveyance of materials to and from machines, finishing, etc.

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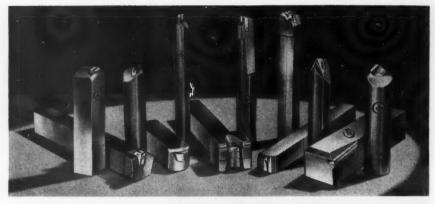


Fig. 7—Diamonds Can Be Mounted in Shanks in a Wide Range of Designs, as Shown by this Representative Selection of Diamond Tools made by F. F. Gilmore & Co., Boston, Mass.

of oil can form around the spindle. Diamonds are essentially precision cutters and should be so used; thus precision conditions must exist in order to obtain the most satisfactory results.

Sliding arms or heads carrying dia-

mond tools (or, in some cases, the work) should be adjusted so closely that all looseness or "play" is eliminated. The fine accuracies of which diamond tools are capable are impossible if there is any "give," "shake" or



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A complete line . . . engineered for performance

Pliers are basic tools in an extremely wide and varied range of operations. The right pliers for the job can make a tremendous difference in speed and workmanship. The Snap-on pliers illustrated are typical of the many types of Vacuum Grip pliers... each type jobengineered for peak performance on the work for which it is designed.

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Sleeve and overarm types . . . in several sizes. Will double output of any single spindle drill press.

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"spring" in the work mounting or tool setting.

The tool should be set with a minimum of overhang, so as to prevent chatter or vibration. If chatter or vibration is present, even though it is too minute to be felt, it is detrimental to both the cutting edge of the tool and the accuracy of the cut. The diamond should be so mounted in relation to the work that all the support possible will be afforded, with a minimum of clearance under the cutting edge; particularly is this true when the surface is broken by holes or grooves, causing an interrupted cut.

Speeds and feeds used in cutting with diamonds vary greatly with conditions, but it is generally considered that the cutting speed should be as high as possible. The usual speed range is from 600 to 1,000 feet per minute. Inasmuch as finish and accuracy are the primary objects in using the diamond tool, the feed should be held to a point that will produce the desired results, Feeds from 0.0008 to 0.003 inch are usual practice, with 0.0008 inch feed used where a practically perfect bearing is desired. A cut of 0.006 inch depth or less will produce the best results.

Finally, it should be remembered that the edge of the diamond will be preserved longer if provision is made for the free escape of chips. Fibre and aluminum chips or cuttings should not be allowed to "pack" on the cutting edge. If the diamond user will observe the few simple suggestions presented here, he will have no difficulty in obtaining the best of results from the use of diamond tools.

(Acknowledgment is made to F. F. Gilmore & Co., Boston, Mass., from whose Manual No. 46 a portion of the material in this article was excerpted.)

Holtite "Tap" Screws for metals and plastics are fully described and illustrated in a six-page folder prepared by the Continental Screw Co., New Bedford, Mass. Copy free upon request.

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Send for Catalog—giving full specifications and prices on the DURO Shaper-Router-Carver—and other DURO quality Machines including Drill Presses, Circular Saws, Band Saws, Flexible Shafts, Lathes, Sanders and Electric Drills.

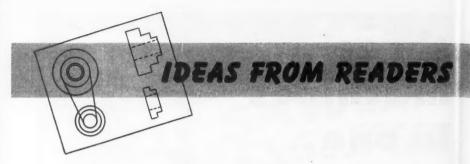
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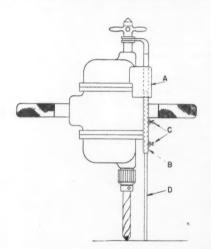
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#### Stop for Portable Drill

By S. N. SMITH

THE drawing illustrates a "kink" that, in our own shop, has prolonged the lives of many drills. Specifically, the kink is a stop which, when



Drawing Illustrating Use of Stop to Keep Drill from Being Broken when Drilling Thin Material

applied to a portable drill, prevents the drill from plunging through thin work when the hole is drilled through and thus prevents the operator from losing control of the tool and breaking the drill.

To apply the stop, a bearing A is bolted to the drill housing as shown. Threaded into the lower end of the bearing is a length of tubing B which serves as a bearing or sleeve for the stop. The tubing should be heavy enough to afford threads for two setscrews C, which are used to anchor the stop. The stop, D, is a section of cold rolled steel rod.

When ready to begin the drilling operation, the end of the drill is rested on the workpiece and the stop is set to the same length as the drill. In the process of feeding the star handle out of the drill housing, which thus feeds the drill into the work, the stop is withdrawn with the handle. Actually, the handle and stop remain stationary while the drill feeds into the work. When the drill breaks through on the opposite side of the work, the stop keeps the drill from being drawn into the hole and thus prevents it from being broken.

#### Replaceable-Section Arbor Solves a Production Problem

(Courtesy General Electric Company)

SIMPLIFICATION of a difficult toolroom operation and savings in labor and material in the production of small aircraft motors were accompGRIFFIN of toug are a most ecoordinary tung form raker-se

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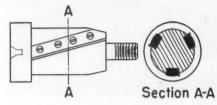
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MODERN MACHINE SHOP

lished at a General Electric plant with a replaceable section arbor developed by F. W. Smith, one of the Company's tool designers.

The life of solid stacking arbors for



Drawing of Stacking Arbor with Replaceable Sections

alignment of punchings during assembly of the stators for small, instrument-type motors was found to be very short because of wear produced by pushing 0.010-inch laminations over surfaces that had been precisionground to very close tolerances. The



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sharp edges of the silicon-steel punchings cut into the arbors easily and soon destroyed their alignment properties. Further difficulty was encountered because the punchings were stacked on an eight-degree spiral. As a result, three lands 0.025 inch wide, to fit into the slots, had to be machined on the arbor. As these lands wore thin, an uneven, saw-edged slot often resulted.

Smith found that by machining the body of the arbor undersize and milling out slots about %-inch wide in it, spring steel lands could be used. These are held in place by keys attached to the arbor by flathead screws and ground to correct bore tolerance when assembled. Replacement lands and keys are carried in stock to be assembled to the arbor bodies when wear becomes apparent.

#### Boring Tubing to Close Limits

By MICHAEL AXLER

WE had a number of pieces of tubing that had to be bored concentric with the outside within plus or minus 0.001 inch. It was necessary to use an independent-jaw chuck for the job, which meant that, if the regular jaws were used, each piece would have to be "trued up" individually.

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> Their built-in performance features insure production-line speed, economy and dependability. Made of high speed steel, Circle "R" Combination Center Drills are listed below for your convenience.

#### DIMENSIONS

No.	Size	Dia. Body	Dia. Drill	Length Overall
700	A-1	1/8"	3/4"	11/4"
701	C-2	13/64"	1/6"	17/8"
702	D-1	15/64"	3/4"	2"
703	E-1	36"	3/32"	21/8"
704	E-2	3/10" 2/16"	1/2"	21/3"
705	F-1	7/6"	3/2"	23/4"
706	F-2	1/6"	3/6"	23/4"
707	J-1	1/2"	7/32"	3"
708	J-2	1/2"	1/32"	3"
709	M-1	5/8"	7/32"	31/4"
710	M-2	5/8"	%2"	31/4"
711	N-1	3/4"	1/4"	3"1/2
712	N-2	3/4"	×6"	31/2"

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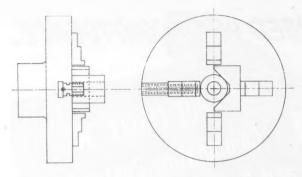
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Drawing Illustrating Use of V-Block for Centering Work without Special Adjustment

the V-block gripping the V-block tightly, it was only necessary to use one jaw for clamping and releasing the work. All pieces were clamped in the same position and consequent-

ly all pieces were machined within the required limits and without the necessity of special adjustment in chucking.

To expedite the job we used a V-block as shown in the drawing.

The V-block was placed in the chuck and a piece of tubing was inserted, as shown, then the piece was trued up by the use of a Universal dial indicator, adjusting the chuck jaws until the hand on the indicator registered O all around. With the three jaws on the ends and bottom of

#### Fast Braze In a Thin Shell

By PHIL GLANZER

RECENTLY the production department in a machine tool shop was faced with the problem of building a Purolator of a much lighter material than had been used previously. A lighter product which could be manufactured at a lower cost was desired, with the stipulation that the quality of the finished job be in keeping with the reputation built up for this product.

Redesigning the filter for a lighter gage metal presented only one problem; this was the question of giving



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Shells Are Prepared for Brazing by Lining Them Up in a Trough, Inserting Silver Alloy Rings, and Setting the Nipples in Place

materially affected the metal structure nor distorted the

shape of the shell. Further, any bad effects could be corrected by annealing.

On the new shell, however, using a metal which came

On the new shell, however, using a metal which came from the final deep draw at a thickness of only 0.042 in., it was obviously impossible to use a gas torch because the metal would be affected and the cylindrical beaded top of the shell would be certain to be distorted to an elliptical form of varying maximum and minimum diameters. Nor could annealing be resorted

to. Even if a brazing alloy of lower flow point than that of the copper alloy were used, too much would depend upon the individual manual skill required to avoid spoilage and delays in brazing with a torch.

It was necessary, therefore, to find some means of brazing which would eliminate the use of a torch, to smooth out the operation and to put it on a mass production basis.

In preliminary studies, interest was displayed in the possibilities of low

to the light-weight case proper strength at what would normally be its weakest point; that is, at the coneshaped bottom. It was also necessary to braze a nipple to the shell at a point a short distance down from its beaded top.

For the heavier gage metal with a 3/32 in. wall, formerly used, it was practicable to use a gas torch for brazing even at the higher temperatures required for a bronze brazing alloy, because localized over-heating neither



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Shank Tools from 1/16" to 11/2" Diameter **Write for Catalog and Complete Information** 

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melting-point silver alloys. The feature most interesting at the time was the low flow-point of the alloy and the kind of joint it made possible. If some means could be devised to provide the heat required for the brazing operation and at the same time eliminate dependence on the human factor, it would be possible to obtain a better joint than with a copper alloy.

After making a study of various methods of supplying heat for brazing, the idea of getting satisfactory results from a furnace operation was discarded. Instead, it was decided to make some experiments toward converting an old spot-welder into an incandescent carbon brazing unit.

It was found at first that it would be necessary to provide a transformer which would provide the correct temperature in the carbons for the braze; that is, about 1400 deg. F. This was a fairly easy job and as soon as the transformer was hooked up, the ex-

periments were begun.

In the beginning, two carbon electrodes of the same thickness were used. The nipple was clamped in place over a ring of silver alloy which had been placed in the recess in the shell coated with flux, then the entire assembly was placed between the electrodes and the current turned on. The brazing temperature desired was secured—but a number of difficulties arose.

One was the tendency of the two electrodes to heat up to the same temperature, with the result that the heat from the bottom electrode was too great for the shell of the unit with which it came in contact, and some distortion of the shell took place. At the same time the top electrode did not heat up the upper part of the joint quite rapidly enough, with the result that uniform results were not always secured.

The next step, therefore, was to





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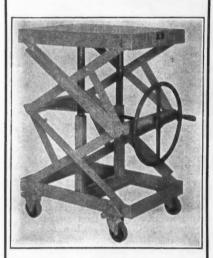
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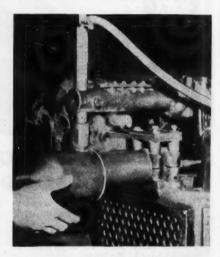
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vary the thickness of the electrodes, making the top one thicker and the bottom one thinner, in order to balance the heat input so as to provide for completely-uniform heating of the metal and brazing alloy, top and bottom. The relative thicknesses of the two electrodes were standardized in order to secure uniform results with no further difficulty.

Up to this point, however, the nipples had to be clamped in place and



Operation of a Foot Lever Air Valve Forces the Electrode into Contact with the Work and Connects the Current for Brazing

the required pressure maintained between the electrodes by foot-lever action. The clamps on each shell were discarded, and uniform pressure provided to hold the nipple firmly against the brazing alloy ring and the shell. It was also necessary to put the use of the current and the time of brazing operation on as much of an automatic basis as possible.

The experiments first provided the means of maintaining pressure on the assembly without clamps, and of making the contact of the electrodes with

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the work. Using compressed air at about 50-lb, pressure, a simple foot lever control was devised which when pressed forced the two electrodes together and at the same time actuated a relay which closed the current cir-In the meantime, flux was daubed around the hole for the nipple. a ring set in place and a nipple placed over the ring, which was then set in position between the electrodes. When contact was made and the assembly held in place by the air pressure, the current quickly provided the required temperature for the brazed joint.

Unless the operator removed his foot from the lever at the right time. however, too much heat was generated and the joint was still somewhat distorted. Consequently a means of cutting off the current at the right time without dependence on the judgment of the operator was necessary. This requirement was finally met by the use of a time relay which was cut in by the actuation of the foot lever and then cut out automatically after a definite time interval as determined by experiments.

Thereafter, except for a few refinements, this bottle-neck was beaten. It was necessary, however, to provide a centering spindle in the bottom electrode in the form of a tapered piece of lava (non-conductive) which would pass up through the shell to center the nipple automatically on the shell. It was also found advisable to use an alloy for the top electrode in order to cut down on the necessity for frequent replacements.

As the operation is carried on in the plant now, it fulfills most of the requirements of a good mass production The operator lines up about twenty shells in a trough, with the holes for the nipples lined up and facing upward. He goes down the line of shells with a brush, applies the flux to each hole, then places the ring in



Special anvils and longer rods are also available. Write for descriptive circular.

#### **SCHNACKE** Adjustable FLUSH PIN GAGE

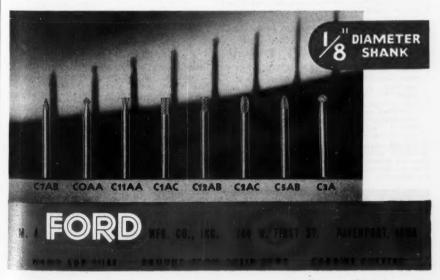
With this new adjustable gage, you can have an accurate Flush Pin Depth Gage quickly and save time and money. Serves many varied gaging purposes in production and inspection. Set consists of 3 interchangeable depth rods (1" - 2" - 3") and 1" diameter sliding anvil, adjustable to required depth. Sliding tolerance feelers at the top are set with micrometer screw from plus or minus .000 to .200, and locks firmly with double locks. Standard set applicable to any decimal dimension up to 3.00".

1017 E. COLUMBIA ST., EVANSVILLE, IND.

# FORD MINIATURE BURRS SOLID CARBIDE

Ford Miniature Carbide Burrs, ground from solid 1/8" tungsten carbide blanks, are available in eight standard shapes, to meet the most exacting demands for production precision operations.

Ford Miniature Solid Carbide Burrs cut with an accuracy and at a speed never before thought possible. Today more metal can be removed at high speeds with carbides than with any other material. For satisfactory performance these burrs should be operated at 20,000 r.p.m. and higher. These 1/8" shank burrs are available singly or in sets.



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MODERN MACHINE SHOP



#### A Few Good Reasons Why You Should Protect "Precision" With "Tool Coat"

 "Proven Performance" say many users who have already installed this modern method of protection for precision, carbide tools, gages and spare parts.

Cost is negligible compared with previous methods of rust proofing and wrapping.

 Superior protection against breakage, corrosion and long time storage.

#### TOOL KOTER

 Simple application with newly developed "Tool Koter," readily portable, weighing only 50 lbs., engineered to meet all your tool coating requirements.

Low wattage can be plugged in ordinary socket, all welded steel construction, heavy duty automatic thermatics.

thermostat, thoroughly insulated.

3. Price of "Tool Koter" only \$67.50, includes special heat transfer oil—ready to operate.

If you are already using this method of protection, investigate Seibert's "Tool Coat" for best results—meets all Government specifications. Prompt Delivery. Write for details. Let us submit recommendations without obligation.

# RILEY & GEEHR, INC. ONE NORTH LASALLE ST., CHICAGO 2, ILL. Phone Andover 5292

Write us for name of nearest representative.

the recess around the hole. Next the nipple is put in place and the trough with its shells is moved up to the converted spot welder, ready for brazing.

Picking up the first shell, the operator puts it over a cone-shaped mandrel surrounding the bottom electrode and lava pilot which centers it exactly under the top electrode He then presses the foot lever which forces the two electrodes into contact with the case assembly, connecting the current. The assembly starts heating at once. Less than three seconds later the joint has reached brazing temperature, the ring has melted and penetrated all the space between the nipple and the shell, and the current has been automatically cut off by the relay. The operator lifts the completed shell off and puts the next unit in place. having reached for it before the current is shut off.

Altogether from the time an assembly is picked up from the trough to the time the next one is picked up, less than five seconds have been consumed.

#### Engineered Sturdimatic Live Centers

A 4-page bulletin completely describing 'Engineered' Live Centers has been released by Sturdimatic Tool Company, 5220 Third Ave., Detroit 2, Michigan.

The bulletin gives specifications and prices of the Standards which are made with Morse taper and also includes three types of Specials. More than forty other Specials are illustrated which were "Engineered" for some specific purpose metal working operation. Characteristic of the design of all Sturdimatic Live Centers is a low overhang and a slight cushioning action that compensates for expansion due to heat, shock and excessive thrust loads—reducing wear to a minimum. Large thrust bearing takes all thrust load, large radial bearing takes only radial load. A properly engineered live center is one of the fundamentals of setting up a job and requires a specialist's experience.

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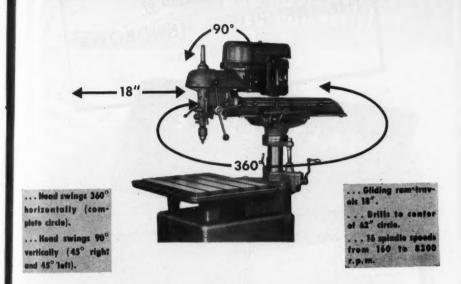
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# GET IN THE SWING AND CUT COSTS WITH WALKER-TURNER RADIAL DRILLS



If you're drilling, tapping or reaming holes up to  $\frac{1}{2}$ " in large workpieces . . . Walker-Turner Radial Drills are the answer for faster production and lower cost per piece.

Within their drilling capacity, these versatile machines have a greater range than standard drill presses . . . are easier to operate and simpler to control than heavy radials. Low first cost, low upkeep and low power consumption are other important advantages of Walker-Turner Radial Drills. For complete description, send for our latest catalog.

WALKER-TURNER COMPANY, INC.

Plainfield, New Jersey



## MACHINE TOOLS

DRILL PRESSES - HAND AND POWER FEED . RADIAL DRILLS
METAL-CUTTING BAND SAWS . POLISHING LATHES . FLEXIBLE SHAFT MACHINE
RADIAL CUT OFF MACHINES FOR METAL . MOTORS . BELT & DISC SURFACEL

May, 1946

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MODERN MACHINE SHOP



You are Invited to Send for a Copy of The 1946 Edition of THE TAFT-PEIRCE HANDBOOK just off the press

TAFT-PEIRCE HANDBOOK

Here's the revised and up-to-date version of a highly useful book. 236 pages cover Tafr-Peirce Contract Man-nforming Service. Tafr-Peirce Contract Manpages cover 1ant-reince Contract man-ufacturing Service ... Taft-Peince Gages Production and Inspection Tools Superpower Magnetic Chucks Taft-Peince-Martell Reamers and Line Reaming Equipment...Surface Grinders
... Back Spot Facing Machines ... and Air Service Equipment. Plus 25 pages of standard tables for convenient reference. Write today for a copy, to: The Taft-Peirce Manufacturing Company, Woonsocket, Rhode Island.

MODERN MACHINE SHOP

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May, 1946

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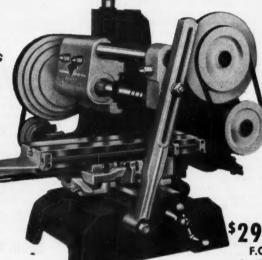
MACHINES

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GHER PRODUCTION rest Capital Investment



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A mighty mill with production equal to that of large, expensive milling machines. Combines latest design and rugged construction with close accuracy . . . bed type, with rise and fall spinale which eliminates the old troublesome inaccurate knee.

Incorporates both horizontal and vertical spindles and travel exceeds that of many larger machines. Heavy steel gears provide smooth power feed and long life.

Dynamic coloring prevents eye-strain and increases the safety factor.

IMMEDIATE DELIVERY

Write for complete catalog

AIRCRAFT MACHINERY

CORPORATION

BURBANK, CALIFORNIA

## News of the Industry

#### Carboloy's New Plant Completed

Carboloy Company, Inc., Detroit, announces that construction of its new "metals" plant has been completed and will be in operation as soon as necessary equipment has been installed. The new plant, designed exclusively for the production of "the hardest metals made by man" is located to the north of Carboloy's present plant on 8-Mile Road in Detroit. The former plant will be devoted exclusively in future to the fabrication of hard metal products.

#### G.E. Awards for Suggestions

Cash awards totaling \$156,658 were paid by the General Electric Company last year to employees whose ideas for improved plant and office operation were adopted under the company's 40-year-old Suggestion System. A total of 13,420 suggestions by employees for improved production were adopted last year from the 30,204 ideas submitted.

Pointing out that nearly \$2,000,000 has been paid by the company for employee suggestions since the plan was reorganized in 1922, Charles E. Wilson, president, said the highest single award in 1945 was \$1,365 presented last March to a General Electric employee at the Erie, Pa., Works for a suggestion regarding an improved technique involving the use of a pneumatic hammer for forming sheet metal into experimental models. Other top ideas brought individual awards of \$700, \$600, and \$500 to employees in Philadelphia, Pittsfield, Bridgeport, and Schenectady. The average award per adopted suggestion was \$11.67, as compared with an \$11.94 average in 1944.

#### British Engineers' Association

The British Engineers' Association, incorporated by license of the Board of Trade in 1912, is the national Association of engineering maufacturers in the United Kingdom.

The services for subscribers to the BEA-REGISTER have just been commenced again after an interval during the years of the war. Full particulars of Membership are available on application to the British Engineers' Association, 32, Victoria Street, London S.W. 1.

#### Eaton Acquires Dynamatic Corporation

The Eaton Manufacturing Company, Cleveland, Ohlo, has acquired all outstanding shares of Dynamatic Corporation, Kenosha, Wisconsin, manufacturers of DYNAMATIC induction drive apparatus. DYNAMATIC manufacturing operations will continue in Kenosha.

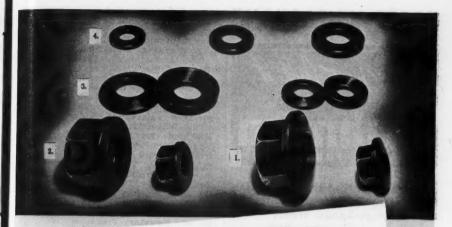
Dynamatic Corporation manufactures numerous devices based on patented induction principles. Outstanding among its developments are the 18,000 horsepower drive for the Boeing wind tunnel in Seattle and the 7,000 horsepower drive for the Pratt and Whitney wind tunnel in East Hartford. Additional applications include electronic speed controls, dynamometers and other equipment for testing engines including jet propulsion, electric couplings, refrigeration and air conditioning drives, oil well drilling equipment brakes, punch press and other machine tool drives, take-up reels, industrial and marine transmissions, and drives for electric shovels and hoists.

#### South Africa Representation

Mr. A. C. Dee, Box 391, Durban, Union of South Africa, Africa, Manufacturers' Representative, is developing his business and is looking for additional lines in engineering specialties that would be of interest to coal mining and sugar producers. Reference: Wm. Moss, Export Manager, Cling-Surface Company, 1032 Niagara St., Buffalo, N. Y.

#### Industrial Diamond Association Organized

To promote the progress and development of the industrial diamond and diamond tool industry and its service to American industry, an association has been formed by the manufacturers, pro-



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Your Jig and Fixture Work with JERGENS Quality Parts

Designers — Tool Makers reduce designing and shop time by stocking Jergens Standard Parls.

Tool room superintendents state: "We profit by using Jergens Standard Parts on two out of every three jobs."

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### SPEED with ECONOMY



#### JOHNSON HI-SPEED No. 120 for Low Cost Heat-Treating High-Speed Steels

Reaches 1500° F. in 5 Minutes!

2300° F. in 30 Minutesi



\$129.50 F.O.B. FACTORY

There is a Quick-Acting JOHNSON Unit for Every Heat-Treating Need. Write for Literature.

JOHNSO 571 E. Pleas Quick A	A	٧	6	n	U	ð	N	1.	N	p	le	C	e	de	a:	of	R		p	le	1	i,	n	le	ve	3.	e	11
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cessors, importers and distributors of diamond tools for industrial purposes, to be known as the Industrial Diamond Association of America; headquarters at 501 Lexington Ave., New York, New York

The Association's program of service to the industry is ambitious, and will stress the importance of research in the manufacture and use of diamond tools as a factor in the improvement of quality of American products. President of the Association is Harvey B. Wallace, President of the Wheel Trueing Company, Detroit, Michigan; 1st Vice President is I. J. Meade, Vice President of the U. S. Industrial Diamond Corporation, New York City, and 2nd Vice President is Charles J. Koebel, President of Koebel Diamond Tool Company, Detroit, Michigan. Athos D. Leveridge, formerly Chief of the Diamond Dies Section of the War Production Board, has been named Executive Director and Secretary-Treasurer.

#### University of Iowa Summer Management Course

An intensive course in Production Planning, Plant Layout, Motion and Time Study, Wage Incentives and related subjects will be presented for plant managers, foremen, industrial engineers, methods and time study analysists and office executives at the College of Engineering, University of Iowa, Iowa City, June 10th to June 28th, 1946. This year will be the eighth of these Summer Management Courses.

The work of the Course will be a well-balanced combination of theory and practice, and the instructors and lecturers have been selected from among America's leaders in the several phases of industrial management and plant operation. Accommodations can be obtained through the University and should be applied for at once.

Gilmore Diamond Tools are the subject of a 36-page catalog published by F. F. Gilmore & Co., 285 Columbus Ave., Boston 16, Mass. Included are illustrations together with brief descriptions of the more popular tools used for truing grinding wheels, including diamond hand tools, needle-point diamond tools, profile grinding tools, multiple or cluster type tools, single point tandem tools, multipoint tools, diamond impregnated dressers, dlamond impregnated blade tools, and so on. Copy of Catalog No. 45 free.

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## THE AMERICAN HOLE CHECKER

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In the Field of Air-Operated Gages . . . Maintains Lead for Accuracy . . . Does Not Vary



When the American Hole Checker first made its bow to industry in 1937 there was nothing else like it on the market. Since then refinements have been made, based on the requirements of many types of users, but basically it was from the first, skillfully designed and soundly engineered.

So the air-operated unit you get today is timetried and dependable for I. D. checking. With an O. D. accessory unit, it may also be used for outside diameter checking.

The Hole Checker is the ideal gage for both production and inspection. It is quickly set up—easily read—and it does not vary. Accuracy to .0001". The standard Hole Checker unit is used with one special sizing plug for each hole checked. Unit is set for gaging parts by means of two master ring gages.

HOLE CHECKER UNIT mounted on Space-Saver Pedestal accessory for easy positioning at any place in shop and quick adjustment to right height. Send parts prints for quotation. Write for new catalog and prices.





The AMERICAN GAGE & MFG. CO.
125 Bayard St. DAYTON 1, OHIO





#### **Are Examples of GOOD MARKING**

Coins are one example of the long lasting qualities of good marking. After years of constant use they are instantly recognizable. Ancient coins have been found in almost perfect condition.

Exacting workmanship guarantees legibility, this factor is of great importance today in the marking of tools and equipment with serial numbers and trade-marks for identification and to facilitate the ordering of replacement parts and equipment.

For nearly a century Jas. H. Matthews & Co. has specialized in the design and manufacture of marking tools and dies. If you have a marking problem, we will be glad to help find a solution. A product worth marking is worth marking well.

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NEW YORK BOSTON, CHICAGO,

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District Sales Offices Cleveland, Cincinnati, Birmingham

# Talk About PRODUCTION / Without DIES



"Enclosed pictures in our plant prove the DI-ACRO Bender will do a real production job. We are making 4,000 completed parts per day which is competitive to most Power Presses." (Name on Request.)

Here is an example of "DIE-LESS DU-PLICATING" typical of a great variety of formed parts readily made with DI-ACRO Precision Machines, - Benders, Brakes, Shears, Picture below shows the DI-ACRO Bender making an acute right angle bend and photograph above shows the finished part formed to die precision. Women operating DI-ACRO units maintain a high out-put on production work.



#### with "DIE-LESS DU-PLICATING". DI-ACRO IS PRONOUNCED "DIE-ACK-RO"

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Squares and sizes material, cuts strips. makes slits or notches. trims duplicated stampings. 3 sizes. Shearing widths, 6". 9", 12".

DI-ACRO Brake

Forms nonstock angles. channels or

examples of parts made

"Vees". Right or left hand operation. 3 sizes. Folding widths, 6", 12", 18".



DIE-LESS" Send for Cataloa showing DI-ACRO Precision Machines and many

May, 1946

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## Guest Editorial

By WILLIAM H. WILKERSON
President, The Auto-Soler Company
Atlanta, Georgia

PRINCIPLES seldom make the headlines, simply because principles never change. Up bobs some liberal upstart with oddments and theories to challenge them or to seem to fog them up. But when the shouting has rolled away, there they are... for principles are eternal.

This is so of economic principles as with any others. We have had new deals, raw deals...bad deals and good. The only one that counts is the square deal; for it always has been and ever will be a principle.

The square deal in any group endeavor is the deal that is best for all. Should any group benefit more than others in the common purpose, then it becomes a bad deal for all. You can't cheat labor or the customer or the stockholder long and get away with it... and you never could. Labor recognizes that it cannot mock-work and win... I mean that quiet, informed, sensible majority of workers who produce to progress.

All men are in common in this great desire... we all want more to live for and more to live with. We can find these only by working together more intelligently, with greater skills resulting from better tools and more earnest intentions. That is all there is to economics... to gain more by producing more. All wages come from effort, and increased wages do not necessarily depend upon more or harder effort... but upon the more intelligent application of effort.

This requires better tools, equipment and facilities with which to work. These require capital. And capital, after all, is only the accumulated savings of working people. Certainly, there were predatory capitalists, but that day is long gone. Your government, your bank and your insurance company all prove that the worker is the capitalist today.

In our own plant, the workers are our capitalists. They become partners after they have been with us a year. They share in the profits. They say that saving is really the hardest work... that it is fairly easy to earn money, but a struggle to save it. And they expect some return for the struggle. They get it.

Better than 85 per cent of our workers have been willing to give that extra margin of effort from which they have bought stock with their hard-earned savings so that they now own nearly 30 per cent of our company. Realizing that their savings is the capital that has made possible better tools and facilities, they know that it has helped them produce more. They are sure they have benefitted in two ways. They produce more because of better tools and skills, which means greater income. And they win just reward for their denial in order to save. They are travelling the only straight road to increased wages... and there is therefore no "mock-work" in our picture.

Mock-work is the most wearisome of all effort because it creates nothing that can be shared. Only bums in the jungle beside some railroad track believe they can get ahead by loafing or by doing less than one is capable of. No one ever runs a race sitting down. More to live for and more to live with comes from that extra margin of effort and talent and skill... the ability to produce a little better each day. That is why Auto-Soler workers are getting ahead.

To prove this principle, our individual production in 1940 (executives, clerical workers, salesmen and factory force) averaged \$2,985 per employee. The average "take-home" was \$1,595 in wages. In 1945, just five years later, by greater effort and by additions in tools, equipment, facilities and skills, individual production had in-

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creased to \$7,208 per employee and average "take-home" had gone up to \$3,613. And this is only a beginning, we confidently believe. Because each increased his production, each increased his wage. There is no other way to win happiness in one's own economic life... nor any other security as commanding and comfortable as this.

Organized in 1932 with what meager capital we could scrape together to develop an idea for a new nailing machine, a year was required to invent it, another to start it market-ward, eight more to pronounce it perfected. Fourteen years later, it is now on the world market and beginning to show profits for our wage earners and for those workers elsewhere who painstakingly saved the capital to make this development possible. The world over, customers in shoe repair and wood working businesses are benefitting because we have given them a better nailing tool.

Our "partners" do not take it easy and leave most of the thinking and planning to management. Nor do they begrudge the share of profit going to capital, for that would be begrudging themselves. They strive constantly to earn more money for capital, thus making the enlargement of their jobs possible; fully realizing that as

they earn more for capital, they will be paid more themselves.

American industry has become the world's greatest not because of the few workers who want to produce less and greedily demand more pay... but because of the many workers who are determined to produce more, knowing that pay increases will

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Someone has said: "A company's destiny depends on what its people do when they are tired." Our employees go home at night and study their work. In fact, that is how so many of our employees are becoming partners. Some of the study consists of pondering good periodicals such as MODERN MACHINE SHOP. Other study involves courses all the way from home study courses to college training in engineering and commerce. Auto-Soler cooperates by paying the monetary cost. But the employees pay the real cost in devotion of time and mental effort. Our workers gladly pay this cost, knowing they are helping themselves to produce more so that the company can pay them more. There is no other way to do it.





GANDAMY

CADDOLO

CARBOLOY

Cemented Carbide in Hub-Type

## **SLITTING SAWS**

for Commutators and other Slitting Operations

> PATENT APPLIED FOR

A steel hub, permanently joined to a Carboloy cemented saw blade, eliminates fracturing due to the strain imposed by mounting screws or nuts. That is one reason why Gay-Lee Commutator Slitting Saws give longer service. All teeth are generated to provide extra strength, to give maximum cuts per tooth. Cutters are slightly concave to insure proper clearance. For speed and accuracy in your undercutting and "U" slotting operations, specify Gay-Lee.

#### GAY-LEE COMPANY FERNDALE 20

In Milwaukee: H. E. Beck Company, 759 Milwaukee St. Phone: Daly 3899.

In Rochester, N. Y.: Production Tool Company, 82 St. Paul St. Phone: Main 4330.

In Chicago: Herbert G. Taylor & Associates, 5916 W. Division St. Phone: Columbus 0614.

In Toledo: George E. Sanderson, 663 Spitzer Building. Phone: Main 3939.

May,

# SKINNER JUICES POWER POWER

The modern method for modern machines



Self-centering power chuck with three non-adjusting jaws and forged steel body.



Double-acting, rotating air cylinder for fast operation of power chucks and special headstock fixtures, Series 2100. Power chucking stands ready to make tremendous savings in time and labor on postwar production...where costs will again spell the difference between success and failure.

Skinner stands ready to help with a complete line of self-centering and combination power chucks, air cylinders, operating valves, gages, filters, etc. Skinner power chucks are designed to grip fast, hold tight, and release fast—they cut down on chucking time that otherwise would be an appreciable part of the total time to produce one piece. They are built to Skinner standards of quality workmanship—they are built to last even under severe, constant use.

Write for Catalog which gives complete details on all Skinner products.

Skinner also supplies a complete line of power chucking accessories, such as air valves, pressure regulating valves, pressure gages, lubricators and air filters.

#### CONSULT YOUR SKINNER DEALER

He is near you—he is ready, willing and able to help you on any standard or special chucking problem you may have.



THE SKINNER CHUCK COMPANY



340 CHURCH ST., NEW BRITAIN, CONN.



HAND & POWER OPERATED MACHINE CHUCKS-AIR CHUCK EQUIPMENT-FACE PLATE JAWS-MACHINE VISES

# NEW SHOP EQUIPMENT

## Gemco Boring and Facing Machine

Introduction of a boring and facing machine especially useful in performing boring, facing, back-facing, drilling, and tapping operations on surfaces of heavy cumbersome workpieces, is announced by the General Engineering Co., St. Louis 4, Mo. An outstanding feature of the machine is the unusual mounting of the spindle housing which provides for maximum rigidity in the performance of facing, boring, and milling operations.

The Gemco Boring and Facing Machine

may be used either as a stationary unit in a permanent position and the workpiece brought to the machine, or as a portable unit in which case it is taken to the workpiece. Where the machine is used extensively for drilling operations, a retractable spindle supported by a fixed quill in the spindle housing is available as extra equipment. The machine can also be modified and provided with an automatic feed mechanism for use as a milling machine. For large boring or facing operations, the backfacing of fianges, and so on, a special faceplate with tool block slide may be

mounted on the head of the work spindle.

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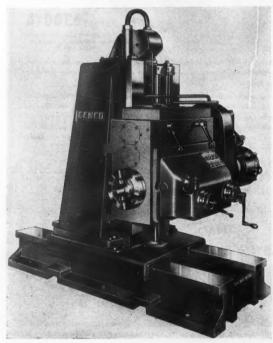
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#### Bliss High Speed Perforating Press

A 75-ton capacity press designed for fine perforating operations requiring precision dies and extreme accuracy in the feeding mechanism has been built by the E. W. Bliss Co., Toledo, Ohio. A solid frame design with a great mass of metal, especially in the bed and crown, is used to properly dampen the vibration waves of constant frequency sometimes caused by continuous operation at fast constant speed. The crown is of semi-tubular section for rigidity. The slide is very heavy and is guided in precision bronze ways. Connections are of the solid steel

Gemco Boring and Facing
Machine

Bliss High Speed Perforating Press

ball type with adjustable ball seat constantly submerged in oil. The slide and connections are fully counterbalanced by heavy enclosed coll springs.

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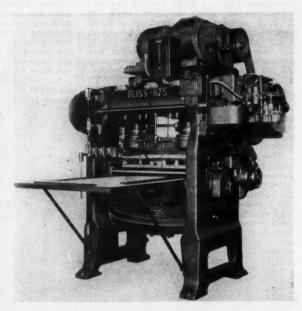
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The crankshaft is of the full eccentric; type, bronze in all the bearings, and is driven by helical steel gears in an oil tight guard for silent performance. The drive shaft and the flywheel are mounted on Timken roller bearings.

The clutch is an air-operated disc type with integral brake discs and is designed to stop the press automatically and quickly when the air valve is shut off. Louvers for ventilation of the clutch are

provided in the guard for the flywheel in case of frequent inching of the press. A substantial guard covers the flywheel, V-belts, and the clutch to afford full protection from the moving parts.

The clutch is controlled by a quick-action air valve, solenoid operated, and controlled by push buttons conveniently located for the operator. The top stop button operates through a rotary limit switch having an adjustable cam on the feed shaft. It is readily adjusted for any speed range so that the press will stop near the top of the stroke when the stop button is depressed. A graduation is provided for this adjustment with num-



bers corresponding to the speed graduations on the Reeves Vari-Speed drive unit located on top of the press.

The feed is of the double roll type and is effected from an adjustable feed crank located on the right-hand side of the press. The feed rolls are of hardened and ground alloy steel and are mounted in bronze bearings.

The feeding mechanism is operated through a removable ratchet on the right-hand side of the press. The ratchet is entirely enclosed yet can be easily removed in a few minutes. The standard ratchet furnished with the machine provides for a minimum feed unit of  $\frac{1}{4t}$ -inch,

## LUERS

## PATENTED CUTTING OFF TOOL HOLDERS PATENTED CUTTING OFF BLADES

ONLY the PATENTED construction of LUERS cutting off BLADES permits normal expansion of bursting chips — MEANS MAXIMUM CUTTING EFFICIENCY.

Manufactured by

J. MILTON LUERS. 12 Pine Street, Mt. Clemens, Mich.

Produced under License Issued by John Milton Lucrs Parents Inc.

corresponding to 1 tooth feed of the ratchet. By adjusting the feed crank for 1, 2, 3, and so on, a feed of \$\frac{1}{47}\$-inch, \$\frac{1}{47}\$-inch, and so on, up to a maximum of \$\%\$-inch is readily obtained. In case in-between sizes of feeds are required, special ratchets can be furnished for a minimum feed as low as 0.010-inch.

A convenient type of releasing mechanism is provided for the upper gripping rolls, operated from a handle on the left side of the machine and releasing both rolls simultaneously. Heavy enclosed coll springs furnish gripping pressure

between the feed rolls.

The press is designed to accommodate sub-press die sets which are easily installed by sliding same on the top of the bolster from the left-hand side through an opening in the housing. The die sets are fastened to the slide and bed by bolts. The dies are made with stationary strippers acting as guides for the punches, and heavy rigid steel stripper supports are provided in the front and rear of the slide. These supports are conveniently adjusted by set screws on each side to proper contact with the strippers. Whenever desired, cam actuated strippers can be furnished.

For die setting and testing, the inch

button affords minute control of the slide movement. The press is equipped with an automatic electrically operated stopping device which will stop the press before the tail edge of the sheet reaches the punching line, leaving a safe margin between the last row of holes and the edge of the sheet.

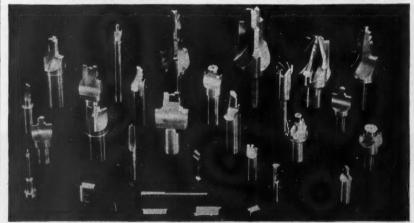
An automatic lubricator included as standard equipment of the press is used for oil lubrication of all the bearings and the feed. Oil lines are provided for lubrication of the guide pins in die sets in order to prolong the life of same.

The machine is regularly furnished for straight front to back feed, but can be furnished with stagger feed, if desired.

#### Gray Traveling Head Milling Machine

The G. A. Gray Co., Cincinnati, Ohio, has introduced a traveling head type milling machine with a horizontal spindle. The head is of extremely sturdy and simple construction. The spindle operates in double opposed, preloaded, precision Timken bearings and is driven by a drive sleeve at a point close to the cutter, thus

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MODERN MACHINE SHOP

May, 1946

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"Michigan" hobs, shaper cutters, and other gear cutting tools are produced to limits rivaling the finest of watches. A few tenths of a thousandths of an inch is the top variation allowable at Michigan even in a hob of this size.

That's one reason why gear cutting tools by "Michigan" consistently produce such accurate work.

The product can never be more accurate than the tool which produces it.

Further, the engineering department at Michigan Tool Company—Gear Production Headquarters will be glad to help you, as it has helped others, in selecting and designing the best possible tools for any given gear production job.



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## MICHIGAN TOOL COMPANY

7171 E. McNICHOLS ROAD

DETROIT 12, U.S. A.

May, 1946

# BRADFORD METALMASTER LATHES

141/2" - 161/2" - 181/2" Swing

TOOLROOM AND ENGINE TYPES

... Also ...



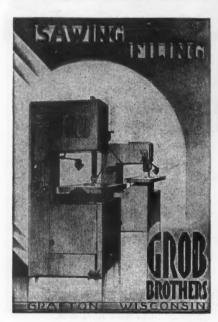
CAM FEED
UNIT TYPE
DRILLING AND
TAPPING
MACHINES

1840 - 1945

The Bradford Machine Tool Co.

Evans at 8th St.

Cincinnati 4, Ohio



greatly reducing the length of spindle subjected to torsion. A 50 h.p. adjustable speed direct current motor is used to drive the spindle.

The column is a heavy, massive structure with a large base to provide rigidity for heavy cuts even with the head in the highest position. The runway, which includes three flat ways, is unusually wide and deep and heavily ribbed to rigidly support the column and is provided with



Fig. 1—Gray Traveling Head Milling Machine with column fitted to saddle having crossways perpendicular to runway

closely spaced leveling screws. A long, narrow guide is formed by the sides of the inner way.

Powerful quick-acting mechanical clamps are provided for clamping the quill, head, and column. A positioning device included on the machine enables the column and head to be readily set within 0.00025 inch by simply pressing a micro-jog button on the pendant switch. The pendant switch has seven push buttons whereby the operator can start or

FOR CLEANER WHEELS



# ECONOMY

Grinding and Cutting Oils and Lubricants
for Every Metal-Working Purpose

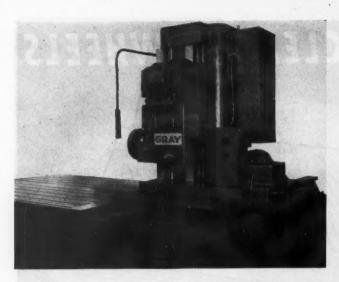
HEWHITE & BAGLEY COMPANY



WORCESTER, MASSACHUSETTS

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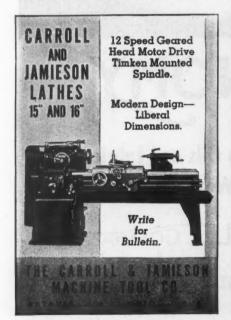


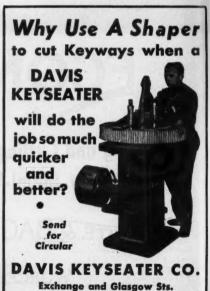
stop the spindle or jog it forward or reverse. He can also control the feed and rapid traverse movements of the head and column from the pendant switch. Fig. 2—Gray Traveling Head Milling Machine with floor plate

Safety devices are provided to protect the machine and the work in the event of faulty operation. Overload protection for the spindle ensures stoppage of the feed motor before the spin dle motor stops. The feed motor cannot be operated except by jogging unless the spindle motor is running.

The machine can be furnished with the column fitted to a saddle having crossways perpendicular to the runway, as shown in

Fig. 1. The column may then be moved perpendicular to, as well as along, the runway at the feed rate or by power rapid traverse.





ROCHESTER, N. Y.

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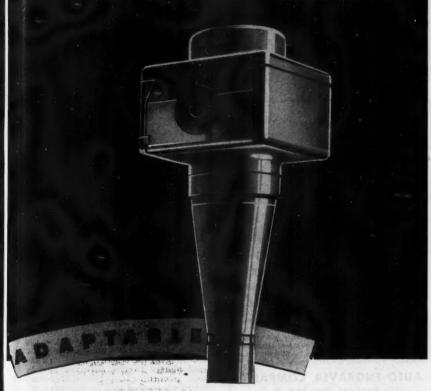
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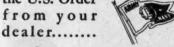
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May, 15

# CRITERION Boring HEADS



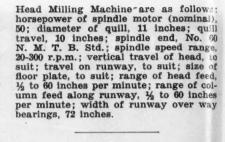
On Criterion Boring Heads shanks are interchangeable enabling operator to use head on different machines. Ideal for slide boring tool holder on small turret lathes. Smooth, compact, rigid. Lead Screw ground from solid AFTER hardening. Sold throughout the U.S. Order



RITERION MACRINE WORKS
BEVERLY HILLS, CALIFORNIA

The machine shown in Fig. 1 is portable and is provided with a lifting bail, which is attached to the machine by a double pivoted arrangement to avoid undue strain in the event that the column is not properly placed when lifting the machine. On the machine shown in Fig. 1, the feed is driven by an adjustable speed variable voltage motor having rheostat control. On the machine shown in Fig. 2, the feed is driven by an adjustable feed motor with electronic control. A potentiometer on the pendant switch controls the speed of the motor.

Specifications of the Gray Traveling

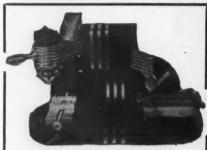


Cincinnati Bickford Super Service

# **Direct Drive Upright Drill**

The addition of a direct drive upright drill for mass production drilling or small lot production to its Super Service line is announced by The Cincinnati Bickford Tool Co., 3226 Forrer St., Cincinnati 9, Ohio. The machine is built is 21, 24, and 28-inch sizes having driving motors from 3 to 10 h.p. The unit is regularly furnished with a 1,200 r.p.m. motor, however, where lower or higher spindle speeds are desired, it can be provided with a 900 or 1,800 r.p.m. motor.

Unless no tapping or spindle reverse is contemplated, the Cincinnati Bickford Super Service Direct Drive Upright Drill is furnished with a magnetic reversing starter for the motor. The push buttons for controlling the motor are lever operated and constructed as an integral part of the machine. According to the manufacturer, 16 speeds and 8 feeds can be obtained in a relatively short time with the machine without involving any major changes. The cover at the top of the unit is removed and the numbered pick-off gears are rearranged on the lettered shafts to the required speeds or feeds according to the direct-reading etched plate mounted at the rear of the gear case.



#### ACCURATE ENGRAVING with Unskilled Operators

Engraves on area 4 by 4 inches. Will engrave curved surfaces without special templates. It engraves smooth lines in any design, number, letter, emblem; on iron, brass, copper, aluminum, soft steels and all plastics. . . Drills a series of holes, or profiles small parts. e Cuts an even channel for wiring on panels. . Increases accuracy and production. • Works from original drawing or templates.
• Etches glass and similar items. • Will not cause distortion. For information and prices write Dept. M.

#### AUTO-ENGRAVER COMPANY

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#### REAL HELPING HAND

It's a help that die makers, tool makers, machinery builders and general machinists have long soughta more accurate and surprisingly faster way of trans-

ferring blind screw holes.



The Heimann Transfer Screw Set is a self-contained, complete tool. No wrenches or pliers are necessary. Made in to 1" diameters. Send for price list.

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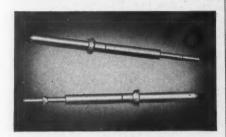


IHREADWELL TAP AND DIE COMPANY . GREENFIELD, MASSACHUSETTS, U.S.A.

CALIFORNIA OFFICE, THREADWELL TAP & DIE CO. OF CALIF., 1322 SANTA FE AVE., LOS ANGELES 21

#### PRECISION PARTS

## FROM STEM TO STERN



From the machining of the blank to the inspection of each finished piece, the production of these stainless-steel valve stems was a typical Ace job . . . typical in its accuracy, typical in its economy. If you are thinking of a source of supply for small parts and assemblies, it will pay you to consider Ace.

RELY ON ACE FOR PRECISION GRINDING Centerless, Internal Cylindrical, External Cylindrical, Blanchard Surface, Plain Surface, and Thread Grinding.

PRODUCTION MACHINING Turning, mill ag, drilling, cutting, tapping, and threading of small machine parts that require precision grinding—on a mass-production basis.

METAL STAMPING Blanking, forming, and extruding of small metal parts on presses up to 75-ton capacity. Spot welding, sub-assemblies and assembly of intricate radio and machine parts.

**HEAT TREATING** Electric and gas furnaces, individually pyrometer controlled, for high-heat, quenching, and carburizing of parts up to approximately 10"x10"x15".

**TOOL AND DIE WORK** All operations for the production of Punches and Dies for small stampings, for Jigs, Fixtures, Gages, Moulds, Form Blocks, Tool Bits and Circular Form Cutters.



#### ACE MANUFACTURING CORPORATION

for Precision Parts

1235 E. ERIE AVE., PHILADELPHIA 24, PA.

An adjustable automatic tapping reverse arrangement for production tapping is available. Tap leads supplied are of the gear-drive type, so as to provide for maximum guidance of the tap. A direct-reading graduated scale provided is said to facilitate drilling to the desired depth within 0.005 inch. When extreme precision to within 0.001 inch is required in facing operations, a special "dwell" attachment can be supplied.

The chrome-nickel steel, multiple-



Cincinnati Bickford 24-Inch Super Service Direct Drive Upright Drill

spline spindle is mounted on precision anti-friction thrust-radial bearings. The heat-treated alloy steel spindle sleeve is accurately fitted into the generously proportioned bore of the supporting head. The feed rack is an integral part of the long wearing, hard surfaced chromium plated spindle sleeve. The spindle and sleeve are carefully counterbalanced for easy operation by an easily accessible weight located inside the column. Standard counterweights are in one piece. When drill heads are to be used, remov-

MA Style D

Style D

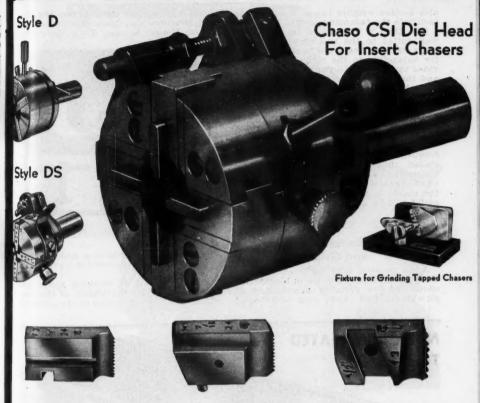


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## HASO Builds New Insert DIE HEAD



HASO, the largest independent manufacturer of Chasers and Die Heads. Not just perience during the war - 26 years experience; 16 years in the manufacture of lasers alone - 10 years in manufacture of Die Heads. Place your orders for Chasers d Die Heads at one stop. CHASO carries a large stock of standard Chasers for mediate shipment. We also carry a large stock of Die Heads and Die Head Parts. CHASO Die Head and Chasers combined, assure you of accuracy and dependaity. All parts of CHASO Die Heads are hardened and precision ground to assure turate threads. Our delivery on special Chasers - one week. Emergency service ground thread chasers - 24 hours. Not just a promise but an actual fact.

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Quality and precision can be built into Chasers only by experience - There is no other way.

Offices in all principal cities. Write for catalog.

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ROYAL OAK, MICHIGAN

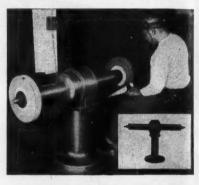
able section weights can be furnished to facilitate the balancing of drill heads.

The Drill is claimed to be especially well suited to the use of medium and large size drill heads due to the provision for balancing, to the rigid support provided by the use of a flanged quill spindle and the fact that ample power is available. A cutting lubricant system is available for the machine. In addition, a chip hopper may be included to facilitate chip disposal.

The frame construction of the machine includes a heavy rectangular column which is reinforced throughout. Where frequent table height changes are anticipated, the position type table can be omitted and an adjustable type table with hand crank screw support furnished for the machine, which is also built in 2, 3, and 4-spindle gang drill designs.

#### Hobart Blacksmith Buffer and Grinder

A low pedestal type buffer and grinder designed especially for use in blacksmith shops for the grinding and buffing of plowshares and other long odd-shaped pieces has been brought out by the Hobart Brothers Co., Motor Generator Division, Hobart Square, Troy, Ohio, The



Hobart Blacksmith Buffer and Grinder

unit is also adaptable to a wide variety of other shops for numerous buffing and grinding jobs.

grinding jobs.

Over 40 inches of working space are provided between the wheels of the machine, and the low design of the pedestal



HANCHETT MANUFACTURING CO., Big Rapids, Michigan

GAGE REAM END COUN SPE

May, 19



REAMERS
END MILLS
COUNTERBORES
SPECIAL TOOLS
MILLING CUTTERS
FORM RELIEVED CUTTERS



#### FALCON TOOL CO.

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Department C

WIRE FOR DETAILS AND DELIVERY DATA-WE'LL GIVE YOU QUICK ACTION! enables the operator to sit at the machine and brace the workpiece between his protected knee and the buffing wheel so as to assure sufficient pressure against the buffing wheel to produce a very smooth finish. The grinder is fabricated from steel sheets rolled and electrically welded, thus ensuring lightweight together with sturdy construction. The ball bearings and smooth-operating long-life non-stalling motor are fully enclosed. The strong, durable shaft and motor are well balanced and are supported on three

heavy duty ball bearings.

Where single phase current is employed, the Hobart Blacksmith Buffer and Grinder is available with a 3 h.p motor of the repulsion-induction type. Where three-phase current is employed, the unit can be obtained with a 3 h.p. motor of the squirrel-cage induction type. Each type of motor uses current only in proportion to the load and is of the non-stalling type so that it will not slow down under rated load, it is claimed. Moreover, each type of motor can be safely operated at a maximum speed of 1,750 r.p.m. The starting switch is located on the pedestal of the machine directly under the motor where it is within easy reach of the hand or knee of the operator.

#### Linley Vertical Milling and Jig Boring Machine

A vertical milling and jig boring machine designed primarily for use in the manufacture of small dies, molds, jigs, and fixtures but equally well adapted to production milling is now being marketed under the trade name of Linley by the Nichols-Morris Corp. 50 Church St., New York 7, N. Y. The machine is provided with eight spindle speeds from 275 to 4 250 r.p.m. and has a 7 x 17½-inch table with 11½-inch working height.

The sliding head and quill of the machine are counterbalanced to eliminate backlash. The spindle is double heattreated and ground all over and lapped on the bearings surfaces. It runs in precision ball bearings for high speed operation, and separate ball bearings are provided for the spindle pulley. The spindle nose is hardened, with the threaded section and bore ground and lapped for maximum accuracy. The spindle nose is designed to accommodate split collets up to and including ½-inch capacity and solid collets for No. 5 B&S or No. 1 Morse taper shanks.

All rotating parts of the Linley Verti-



# SPECIAL CUTTING TOOLS AND GAGES



#### CRAFTSMANSHIP LIKE THE GUILDS OF OLD

Like these famous artisans of the middle ages, we take real pride in the accuracy and workmanship of our special cutting tools and gages. And with this object in view—we maintain the most careful supervision over every process of manufacture.

We also take pride in our dependability of delivery—you can rely on our promises.

We invite you to send us your prints for special cutting tools and gages of the more difficult types, such as built-up, flush-pin, snap, straight side, spline, etc. We promise your full satisfaction—and real speed—if necessary.



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# HOURS OF DOWN TIME?

or a break for a cigarette!





Simple Intelligent Rapid Revolutionary Low Cost

Recovery and Segregation of lubricant, coolant, sludge, metal chips—according to alley, including water, semi-mud and other liquids. Machines that formerly required hours to clean can now be cleaned in minutes—or in the time the operator takes a break for a cigarette.

One manufacturer reports "This vacuum equipment is very essential in removing sludge, oil, grime, sodawater, dirt, etc., from 2700 machines. This method is very efficient, and greatly increases the life of the machines as well as conserves considerable man-power now urgently needed on production operations."

Write for details stating your problem

# Doyle VAC-IT

DOYLE VACUUM CLEANER CO. 3225 Stevens St., S.W., Grand Rapids 7, Mich. cal Milling and Jig Boring Machine are carefully balanced. The compound table assembly is handscraped on all flat surfaces. The dials provided are 2½ inches in diameter with 0.001-inch graduations. A direct-reading micrometer depth gage also included with the machine enables work to be accurately machined to predetermined depths without pencil figuring.

Standard equipment of the machine includes a ½ h.p. a.c. motor, reversing

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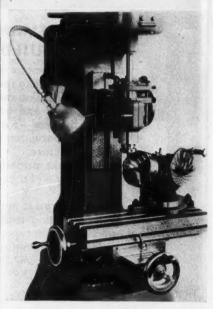
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Close-up view of Linley Vertical Milling and Jig Boring Machine set up for machining operation

switch, two belts, one split collet of any size up to ½ inch, one solid collet for taper shank, necessary wrenches, and adjustable light. Other accessories for increasing the usefulness of the machine are readily available.

#### Kearney & Trecker CSM Milling Machine

Designed for maximum efficiency when milling with carbides, a knee-type milling machine designated as the CSM is

HEAT TREAT SMALL PARTS In Your Own Plant ESSENTIAL FOR TOOL AND DIE SHOPS

You save time and money heat treating small tools and dies in a Cooley Electric Furnace. Uniform temperatures are maintained throughout the furnace chamber to assure even heating of parts. The heating elements are embedded in refractory materials, protecting against atmospheric attack. They are

easily replaceable.

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To hold 1600° F. in the MH-3 furnace requires less than 2 kw. At power rate of 2c per kw.-hr., operating cost is under 4c per hour. The MH-4 furnace requires less than 2.5 kw. or under 5c per hour at the same rate. Cooley Furnaces are easily installedready for immediate service by connecting power lines to two terminals. Quiet in operation-no fumes or odors-no ventilating necessary—they can be located at any convenient place in the shop.



#### TWO NEW OPTIONAL FEATURES AVAILABLE

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1. Vertical Lift Door - Counter weighted for ease of operation-conserves heat where door need not be fully opened to enter or remove work. Supplied in place of standard hinged hearth door at \$20.00 additional to regular furnace prices shown below.

#### AVAILABLE IN TWO SITES

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Туре	Chamber Capacity	Amps 115 V	Watts	Amps 230 V	Price
MH-3 MH-4	8"W 6"H 14"L 10"W 6"H 18"L		4800	20.9	\$146.00* \$222.50* orth Plate

MAX. SAFE TEMPERATURE—Continuous operation, 1750° F.: Intermittent operation, 1850° F. AUTOMATIC CONTROL—Indicating Controlling Pyrometer—Thermo-couple and lead wire—approximately \$150.00.

2. Heavy Gauge Steel Stand — For ease of installation and operation-locates furnace at most convenient operating height and provides additional working and storage space. Add \$35.00 to regular furnace prices shown below.

#### NO SALESMEN WILL CALL

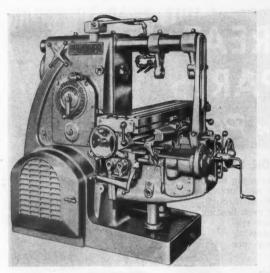
Ask for free information and ordering instructions so you can make your own decision and determine your own requirements. Write for Bulletin No. 50 today-no obligation.



#### COOLEY ELECTRIC MANUFACTURING

34 South Shelby Street Indianapolis 7, Indiana

Export Department, 1111 S. Ferry Building, New York 4, New York



Kearney & Trecker CSM Milling Machine

per minute in approximate geometrical progression are provided. Climb cutting equipment is supplied for the table.

#### G. & L. Multiple-Purpose Portable Machine Tools

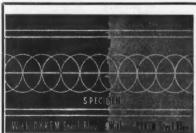
The Giddings & Lewis Machine Tool Co., 146 Doty St., Fond du Lac, Wis., is now producing a portable machine tool which is designed for use in performing unusual drilling, tapping, boring, milling, and facing operations. In addition to being portable, the machine features a swivel head and swivel

column, thus permitting unusual latitude in the alignment of the spindle in correct position to machine the work. The column can be swiveled 360 degrees and the headstock 45 degrees up and 45 degrees down from the horizontal.

The G. & L. Multiple-Purpose Portable Machine Tool is provided with a lifting bail to facilitate handling. The complete machine may be lowered through an opening as small as 100 inches in diameter and, due to the fiexibility of spindle alignment, practically any surface may be reached in the interior once the tool is placed in position. The machine is said to be ideally suited for machining angular holes and faces of workpieces which are not readily set up in the usual manner for horizontal or vertical machining alignment.

announced by the Kearney & Trecker Corp., Milwaukee 14, Wis. The massive solid-back column of the machine incorporates the spindle drive motor which is cross mounted in the base. Power is transmitted to the spindle through multiple V-belts and the spindle speed selection box. Sixteen quick-change speeds from 50 to 1,250 r.p.m. are obtainable in approximate geometrical progression. The spindle is provided with a center bearing spindle to reduce deflection. A heavy flywheel splined to the spindle is said to assure a uniform flow of power to the motor.

A feed and rapid traverse drive motor mounted on the right side of the knee of the machine furnishes power to the table feed mechanism. Thirty-two quickchange feed rates from % to 90 inches



# DYKEM STEEL BLUE

Stops Losses in Making Dies and Templates

Simply brush on, right at the bench; ready for the layout in a few minutes. The dark blue background makes the scribed lines show up in sharp relief, and at the same time prevents metal glare. Increases efficiency and accuracy. Write for full information.

#### THE DYKEM COMPANY

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May, 1946

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MODERN MACHINE SHOP

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# CHICAGO STEEL PRESS BRAKE

New Type "300"



# SPEED PRODUCTION OF SHEET METAL WORK

USE FOR

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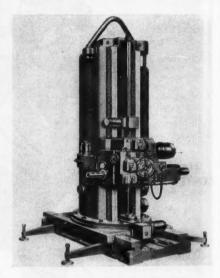
4. NOTCHING 5. BLANKING

The New Type "300" CHICAGO STEEL PRESS is accurate, compact, and ruggedly constructed of highest quality materials. Sizes 4, 5 and 6 ft. capacities up to 10 gauge...

#### DREIS & KRUMP MFG. CO.

7418 LOOMIS BLVD. • CHICAGO 36

Typical applications for the G. & L. Multiple-Purpose Portable Machine Tool include (1) the machining of large castings and weldments, (2) the internal machining of large open-end workpieces, (3) the machining of marine installations within the craft, (4) the machining of stationary engines in place, and (5) the machining of difficult-to-reach angular holes and surfaces. Scales and verniers for headstock and column travels are provided and both swivels are graduated to permit accurate setting. Independent



G. & L. Multiple-Purpose Portable Machine Tool

operation and setting of the spindle, the headstock on the column, and the column on the runway are possible since a separate motor is used to power each of these components.

# Cincinnati No. 2 Radius Grinding Attachment

The Cincinnati Milling Machine Co., Cincinnati 9, Ohio, announces a radius grinding attachment for use on Cincinnati No. 2 cutter and tool grinders in grinding 0 to 1-inch radii on cutters from 4 to 12 inches in diameter and having flute lengths up to 3 inches. Adjustment to the desired radius is obtained through

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# TORIT

#### DUST COLLECTORS

trap dust at its source . . . protect valuable machinery and workers' efficiency

TORIT Dust Collectors are selfcontained, portable, and easy to install. They save fuel by returning filtered air to the room.

Nearly 10,000 TORIT Dust Collectors, ranging from 1/3 HP to 3 HP, are in use. They fit every production plan, and have paid big returns in plant cleanliness and employee efficiency.

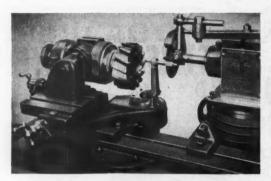
Write for TORIT Dust Collector Catalog No. 30 giving full information on the different size units.

TORIT MANUFACTURING CO.

296 Walnut Street

St. Paul 2, Minn.





Cincinnati No. 2 Radius Grinding Attachment set up on cutter and tool grinder

a micrometer gage, inserted into a tapered hole which is bored concentric with the swivel point of the attachment. The micrometer gage has a range of 1 inch and is arranged to pivot 90 degrees to positive stops. Zero reading in both positions indicates that the junction between the face and diameter of the cutter will swivel directly above the center of the pivot; or, in other words, zero radius will be obtained. From this setting, the cutter may be accurately offset through two adjustable slides to the desired radius,

as indicated by the micrometer.

Both slides which carry the cutter mounting assembly can be independently operated by a crank and screw. Micrometer dials, graduated to read in thousandths of an inch, are fitted to the screws so that the slides may be accurately moved in small increments. The complete upper part of the unit swivels on a large anti-friction

trunnion, which is adjustable for wear. Adjustable positive stops limit the swing

to 90 degrees.

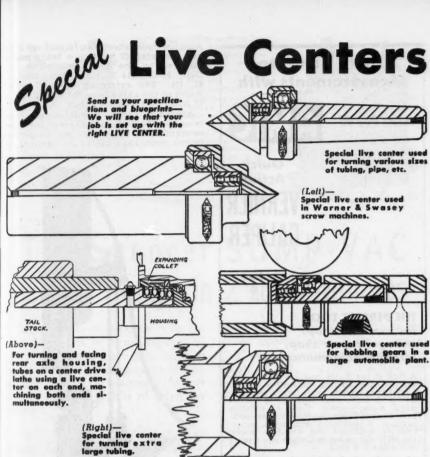
The standard work head supplied with each Cincinnati No. 2 cutter and tool grinder is used in conjunction with the No. 2 radius grinding attachment.

#### Mead Impact Air Hammer

Claimed to be particularly useful in performing multiple piercing operations



(Abe



Characteristic of the design of all STURDIMATIC LIVE CENTERS is a low overhang and a slight cushioning action . . . that compensates for expansion due to heat, shock and excessive thrust loads—reducing wear to a minimum. A properly engineered live center is one of the fundamentals of setting up a job and requires a specialist's experience . . . standard shanks with Morse taper carried in stock.

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#### Fast, Accurate Measurements with

the NEW

AMIC



THE PERFECT TOOL for machine shop, garage, repair shop, aircraft-maintenance, etc

A flick of the thumb and you've got your external and internal dimensions. Knife-edged jaws provide exact thread measurements. A depth gage blade gives speedy depth measurements. Made of stainless steel or toolsteel; packed in a sturdy leather case. Scientifically engineered, painstakingly machined and American made, the AMIC Quick Action Caliper is a quality tool without a rival.

Graduations in English—1/32" or 1/40"; in metric—full mm.

Reading on Vernier 1/128" or 1/1000" and 1/10 mm.

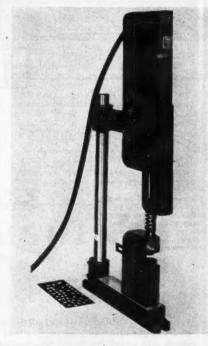
Also AMIC Precision Vernier Calipers, Height Gages, Depth Gages, Pocket Calipers, Comparators, Precision Graduated Metal Scales.

Write for FREE Booklet B and price list or telephone PEnnsylvania 6-0687

\* Registered Trade Mark.

AMERICAN MEASURING INSTRUMENTS CORP. 240 WEST 40th STREET NEW YORK 18, N. Y. on large metal sheets, an impact air hammer weighing 27 lb. is now being manufactured by the Mead Specialties Co., Dept. H-42, 4114 N. Knox Ave., Chicago 41, Ill. The extremely narrow overall width of the unit allows for the punching of holes on 1%-inch centers.

According to the manufacturer, there is no specific limit to the size of the sheet or number of holes that can be pierced in one operation with the air hammer. A



Mead Impact Air Hammer set up with a Wales-Strippit punching unit for multiple piercing operations

suitable table can be made with a heavy steel plate, 1 to 1½ inches in thickness, provided with rows of tapped holes by means of which units can be dogged or bolted down in any desired location. Tables up to 8 x 40 feet can be made. If desired, such tables can be provided with a "gate" at one end so that the punches mounted at that end can be swung out to allow for insertion and removal of the work. Thus, all four sides of the sheet can be pierced at one time.

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DAGGET .

Pick-up position: Suction hase on intake atswivel connection—
Two way valve open—slide valve in—
three way valve open to atmosphere.

Discharge position:
Pressure in tank—
hose on drain valve
— two way valve
closed — slide valve
out closing intake to
vacuum producer and
opening ports to allow air to be drawn
into vacuum producer
from outside — three
way valve closed delivering air into tank
under pressure.



# The Spencer SUMP-VAC Cleans Sumps in 2 to 10 Minutes

A Spencer vacuum producer mounted on a closed tank on wheels removes all liquid and sludge from sump tanks in two to ten minutes compared with half an hour with former methods. The rate of pick up is 40 gallons of liquid per minute.

The tank capacity is 125 gallons or enough for 3 to 5 average sumps. A filter basket collects chips and heavy sludge. A Neoprene float valve prevents overfilling of the machine. It is emptied by gravity in two minutes. By turning the valves provided with the machine and connecting the hose to the

drain valve, liquid can be discharged under approximately 3 lbs. pressure. This permits raising the liquid to a height of 6 ft., emptying the tank into a drum or other container for easy disposal.

No priming is necessary—and all material in the sump tank is cleaned out by air vacuum after the liquid is removed.

Sizes 3/4 or 11/2 horsepower, universal or single phase motors, 25 to 60 cycles, 110 or 220 volts or d.c.; 121/2 foot vacuum hose lengths and 50 foot cable extension. Ask for the bulletin.

# SPENCER VACUUM CLEANING

THE SPENCER TURBINE COMPANY, HARTFORD 6, CONN.

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May, 1946

MODERN MACHINE SHOP

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Where smaller work is to be pierced, several groups of impact hammers may be mounted on the one large table, each group being independently controlled by

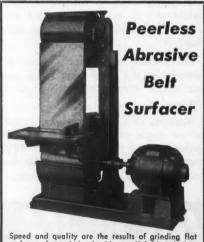
its operator.

For punching operations, the Mead Impact Air Hammer is normally used in conjunction with standard punching units, such as Wales-Strippits. The hammer can be operated in any position, thus making it adaptable to the piercing of large sheet metal items after forming. The capacity of the hammer when operated with an air pressure of 100 p.s.i. is a %-inch hole in 0.065 gauge cold rolled steel. The ram is said to deliver a blow equivalent to approximately 4,000 lb. With suitable attachments, the impact air hammer is also said to be efficient for upsetting rivets, blanking out soft materials with knife dies, light coining and forging operations, stamping letters and numbers on plastics and other synthetic compositions, brass, bronze, aluminum, and steel.

The Mead Impact Air Hammer is available with three different sizes of basenarrow base (1% inches wide) for multiple applications; standard base (41/4 inches wide) for individual setups where a heavy supporting table can be used: and extra heavy base (10 inches wide and weighing 70 lb.) for use where the unit is mounted on ordinary light shop benches. The value of the impact can be readily adjusted from the maximum of approximately 4,000 lb. down to a minimum of only a few ounces. The cycle of the ram is automatic, the ram returning after each blow to a "cocked" position ready for the next stroke. Several blows per second can be struck, if desired. Air consumption at full stroke is said to be 5 cubic inches per cycle.

#### Eisler No. 310-AA Universal Spot Welder

Especially suited for the spot welding of all types of sheet metal work, a universal spot welder designated as the No. 310-AA is now being offered by the Eisler Engineering Co., 750 S. 13th St., Newark 3, N. J. In addition, the unit can be used with a hand-operated push-type and turn--type gun welder and for a.c. arc welding (100 to 400 amperes). The gun welder can also be supplied for air operation. An outstanding feature of the Eisler No. 310-AA Universal Spot Welder is the



surfaces of métal, hard rubber, celluloid and plastics on the PEERLESS ABRASIVE BELT SURFACER.
Made in sizes of 9", 14" and 20". Vertical and
Horizontal Types. Write for illustrated pamphlet.

PRODUCTION MACHINE CO.

GREENFIELD, MASS.



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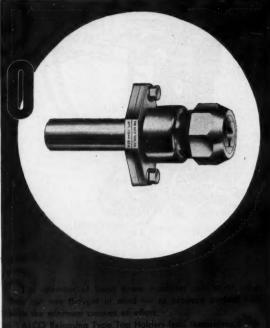
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#### May, 1946

RELEASING MODEL TAP HOLDER



Please write for new complete Catalog No. 6.

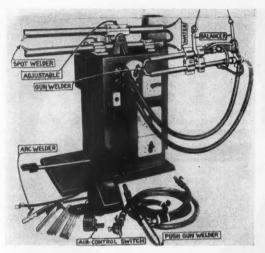


he concentric olignment of the top with the hole, anstruction of the ALCO tool make this the most ou and fool-proof top holder of all the releasing types. Designed especially for heavy duty work and for cutting threads to the most exacting standards.

The quick and positive alignment of the tap for concentricity saves valuable time in setting up and the fact that wear on the tap is evenly distributed lengthens tap life and prevents breakage.

The most convincing method of proving that ALCO Releasing Tap Holders will save time and improve work produced is to install just one of them on your next set-up. Please write for complete engineering data and prices.

THE ALCO TOOL CO., 152 Birdseye Street, Bridgeport, Conn.
Detroit Office: 2441 Field Ave., Telephone Dixson 2434
Chicago Office: 608 S. Dearborn St., Telephone Webster 2868



unusually deep throat provided by both horns which can be lengthened or shortened by sliding them in the bearings to suit the size and type of sheet metal work to be welded. An additional adEisler No. 310-AA Universal Spot Welder

vantage is that the horns are mounted on top of the fabricated base and thus the machine is suitable for spot welding large sheet metal parts.

The machine is intended for deep sheet metal work of light gauge but can also be used in welding heavier work in the short throat position. The kvarating of the welder can be varied from 20 to 50 kva at the shortest throat depth. The horns as well as the tip holder and tips are water cooled.

Available for air as well as foot operation, the Eisler No. 310-AA Welder can be supplied

either with a mechanical or all electronic type timer and contactor. The type of wiring utilized allows for the independent performance of spot welding and are welding operations.

# The MEEKER Timken Roller Bearing Live Center

The original live center with replaceable point. With the Greater Accuracy and Load Carrying Capacity of Timken Tapered Roller Bearings.



The bearings are provided with adjustment for pre-load and take-up for wear should any occur.

Removable points may be replaced with new points, or points of special design. Seat for point ground after assembly, assuring true running interchangeable points.

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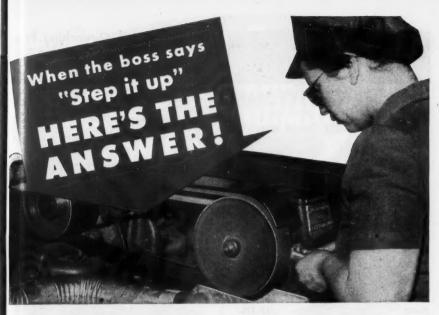
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May, 1946



You can meet every need for grinding and finishing speed with 3M Abrasive Belts and 3M Segment Face Contact Wheels. These 3M developments are scientifically designed for fast, clean grinding on hard or soft metals; for smoother

finishing on curved or flat surfaces. Their cushioned action eliminates arm-tiring jars and jolts-gives better finishes at higher speed, better performance at lower cost. Write today for our free booklet describing this modern grinding method.



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ROTARY STAMP

Single wheel, for stamping on brass. aluminum, soft steel, plastic and wood, with a single hammer blow. All figures on 1 wheel, entire alphabet on 2. One stamp replaces 12 individual, hand stamps. Characters from to" to 3/8". Also with shank for press.

> Bulletin MS-1H.

#### NAME PLATE DETAIL PRESS

name or number.



NUMBERALL STAMP & TOOL CO. HUGUENOT PARK STATEN ISLAND 12. N. Y

#### Gleason No. 16 Quenching Press

The Gleason No. 16 Quenching Press illustrated herewith, product of the Gleason Works, 1000 University Ave., Rochester 3, N. Y., is designed for holding and quenching heated gears and other parts so that they may be hardened without distortion. The part is clamped between upper and lower dies for the quench, and the oil circulation is carefully controlled. The press is equipped with a built-in



Gleason No. 16 Quenching Press

pumping system and oil reservoir, thereby reducing the external oil supply to approximately 35 gallons. All stages of the quenching operation-the volume and rates of flow of the quenching oil-are automatically set by controls located at the front of the machine.

The Gleason No. 16 Quenching Press is designed for oil quenching only and is air operated. The dies are especially designed to handle the particular work being quenched and can be supplied for hardening bevel, hypoid and spur gears, liners, bearing races, discs, and other

parts of varying shapes.

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# COLL CHARKING MARKING FOR PART NUMBERS!

MODEL 175 HYDRAULIC



This Hydraulic Marking Machine speeds marking operations to reduce costs. It will mark flat surfaces and peripheries when equipped with proper accessories. Setup time is reduced materially in this Hydraulic Machine since depth of marking is controlled by a simple hand valve.

Part thickness or diameter variations up to 1/4" will carry uniform marking depth without change in table setting.

Die Slide Travel . . . 6"

Send prints of parts, showing required marking and its location on the part with required hourly production for recommendation and quotation.

Designed and Built by

GT9

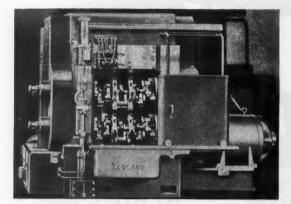
GEO.T. SCHMIDT, INC.

1806 W. BELLE PLAINE AVE. CHICAGO . 13 . ILLINOIS

May, 1946

MODERN MACHINE SHOP

279



#### LeBlond Automatic Crankshaft Lathes

The R. K. LeBlond Machine Tool Co., Cincinnati 8, Ohio, announces a line of automatic crankshaft lathes consisting of a Model 6AC for rough or finish turning pin bearings, Model 7ACL for rough turning line bearings, Model 1LB for the combination rough and finish

turning of line bearings, and Model DM for finish turning line bearings. The Model 6AC is a two-

The Model 6AC is a twospindle machine built for simultaneously rough turning pin bearings on both spindles or simultaneously finish turning pin bearings on both spindles. The drive is from both ends in hydraulically operated pot type chucks. Two master crank-

shafts, enlarged duplicates of the crank to be machined, pattern the movement of the tools through the cycle of rapid traverse to start of cut, feed movements to the sizing stop, and rapid return to starting position. The predetermined design of the cam allows for variation of feed on any part of the cut. The machine is equipped with a dynamic reversing switch for automatically stopping the

# Timesaver LAPPING COMPOUND



A gear lapped to precision, in assembly, with Timesaver Compound.

You can produce perfect fits, assure quiet operation and save money by substituting Timesaver for expensive hand scraping and running-in operations.

It is easy to use and rapidly produces perfect fitting bearing surfaces.

Used by leading manufacturers for the past twenty years for the fitting of all types of gears, bearings, valves, pistons, slides, etc.

Timescrer Compound will not imbed into any metal or continue to cut.

Grades for lapping hard and soft metals.

A request on your letterhead will bring free samples and literature.

## TIMESAVER PRODUCTS CO.

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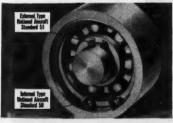
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NOW YOUR MACHINES CAN HAVE THE DESIGN ECONOMY of retaining rings regardless of load, stress or accuracy in-volved. Waldes TRUARC high precision retaining rings do the job of nuts, shoulders, collars and pins. Yet they allow lighter, more compact units-make assembly and disassembly quicker, easier. TRUARC rings give better, more dependable retention because their perfect circularity insures a never-failing grip. There's a Truarc ring for every mechanical product.

FREE! See how Truarc can cut your production and maintenance costs! Write today for Truarc Booklet 273, showing applications and design sketches.

U. S. PAT. RE. 18,144



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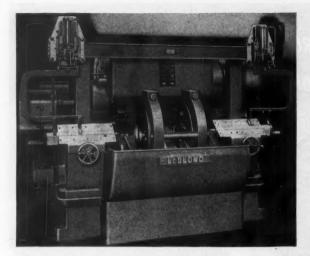
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LeBlond 7ACL Automatic Crankshaft Lathe

spindle at any predetermined position, and a control circuit interlocked with a chucking valve. The average production claimed for the Model 6AC is 30 to 50 cranks per hour.

The Model 7ACL utilizes a single or double center drive for rough turning all line bearings in one operation. The driving head and tools and mechanical feed are electrically powered. A "dwell" is provided at the end of the cut for removing rough tool marks. The unit is equipped with an air-operated carrier crane for the handling of crankshafts in and out of the machine, which is claimed to have an average production of 15 to 25 cranks per hour.

The Model 1LB is a single-spindle, either single or double-center drive lathe with separate sets of tool units for simultaneously rough and finish turning line bearings, flange and stub ends of crank-

## Machining Work Can Be Speeded By Means of Sandblasting!

YOU REMOVE HARD SCALE, BURNT SAND AND OTHER HINDRANCES TO RAPID MACHINING WHICH ALSO TAKES THE EBGE OFF CUTTING TOOLS ALL TOO QUICKLY

#### **Sand Blasting**

is purely a labor-saving process which merits close consideration from manufacturers in all materials — metals, plastic, bakelite, glass, etc.

#### MAT and SATIN FINISHES

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# Ettco-Emrick TAPPING ATTACHMENTS on your drill presses

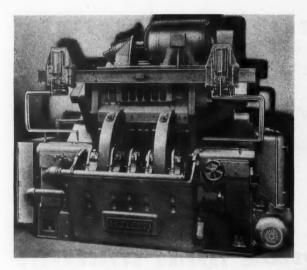
If you need more tapping production, get the extra capacity from your drill presses. Just clamp high speed, sensitive Ettco-Emrick Tapping Attachments to the spindles, and you're set to do any tapping within the range of No. 0 to 1" taps. No need to worry about high tapping costs either. Exclusive Ettco-Emrick design and construction features not only make tapping easy, even for inexperienced operators, but also give full protection against broken taps and work spoilage.

**BULLETIN No. 2** gives full details. Write for a copy.

# ETTCO TOOL CO.

598 Johnson Ave., Brooklyn 6, N. Y. Detroit 1 Chicago 6

Over 25 years specialization in solving Industries drilling and tapping problems



LeBlond 1LB Automatic Crankshaft Lathe

shafts. Two sets of oppositely moving cutting tools rough out all line bearings, followed by another set of finishing tools on a separate tool unit moving in from

a third direction for finishing previously roughed-out surfaces. The finish tool unit provides a positive, smooth dwell of predetermined duration for sizing the work, contains a coolant system, and acts as a chip guard and apron for the pro-tection of the operator. The lathe is powered by combination electric-hydraulic motor units, controlled by readily accessible electric push buttons which, in turn, control limit switches, solenoids,

and electric relays and contactors. Average production of the Model 1LB is said to be 12 to 20 cranks per hour.

The model DM is a four-stage indexing



Combination Demagnetizer and Electric Etching Pencil. Marks symbols in hard-est steel. Demagnetizes instantly. One of our models popular in tool rooms for 15 years.

Luma Electric Equipment Co. DEPT. MS TOLEDO 1, OHIO



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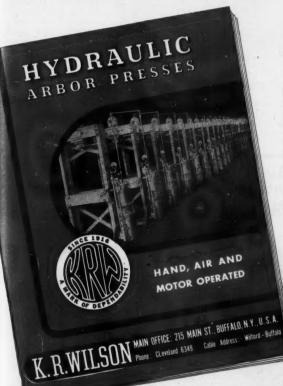
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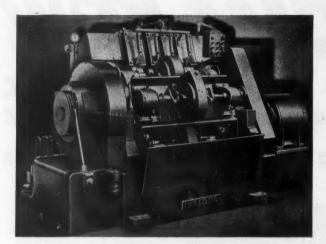
K. R. WILSON, 215-217 Main Street, Buffalo 3, N. Y. Please mail me a copy of your New Hydraulic Arbor Press Catalog.

Name\_\_\_\_

Address State

City & Zone\_\_\_\_State\_

16



LeBlond DM Automatic Crankshaft Lathe

machine without loss of time for loading and unloading. The lathe is powered by combination electrichydraulic motor units controlled by readily accessible electric push buttons, and is equipped with a red and green control light system which not only protects the operator but also affords a visual check of the progress of the work. The average production claimed for the machine is 30 to 40 cranks per hour.

machine built on the revolving drum principle for finish turning line bearings, completely eliminating all rough grinding operations. The addition of a fourth or loading station makes possible continuous uninterrupted operation of the

#### Haskins Type UT Electric-Air Controlled Tapping Machine

Featuring an improved frame design. air-operated table raising and lowering unit, super-sensitive electric-air control,

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## BLACK DIAMOND DRILL GRINDER



#### FOR SMALL GAUGE AND FRACTIONAL DRILLS

When you need sharp, small gauge or fractional drills in quantities—it costs real money to put an experienced mechanic to work on them. Hand grinding is not accurate.

With a Black Diamond, even the most inexperienced laborer can keep all small drills sharp, ready to meet any emergency—with lips accurately ground to exactly the same length, proper angle and with correct clearance for fast, precision drilling.

This motor-driven machine cuts grinding costs 50% and more, saves expensive drills, reduces drill breakage and work spoilage to an absolute minimum and pays for itself quickly.

quickly.

And when you order a Black Diamond be sure to include the web thinning attachment which accurately grinds Notched, Colton, or so-called Crank Shaft points. Write for details.

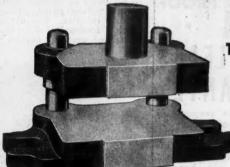
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When your Producto Die Sets go on the job they will be exactly according to your specifications . . . and will assure you quick set-up and long trouble-free production runs.

Every factor in construction and material used is carefully checked before shipping . . . saving you time and money by eliminating any error.

#### POINTS CHECKED

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Also makers of Modern Machine Vises, Hand Tapping Machines and Utility Presses. Distributors of Dickerman Automatic Press Feeds.

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May, 1946

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STOP LEAKS INSTANTLY

Leaks, water seepage in concrete walls can be stopped instantly—permanently with FLEXTITE. This material will convert wet basements into bonedry useful space. Will seal leaks against water pressure. Can be used in ele-

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and maxium accessibility for adjustment and replacement of control units, the Haskins Type UT Electric-Air Controlled Tapping Machine illustrated herewith has been brought out by the R. G. Haskins Co., 619 S. California Ave., Chicago 12, Ill. The design of the unit includes a hinged door the full length of the control chamber which permits easy access to all units of control, motor, lubricant pump, wiring panel, transformer, and electric circuits. The air head is made of cast aluminum with bronze cylinder walls and graphite carbon pistons so as



Haskins Type UT Electric-Air Controlled
Tapping Machine

to resist rust and corrosion resulting from moisture in the air lines.

The Haskins Type UT Tapping Machine is provided with a baked gray crystal non-glare finish which is claimed to be impervious to oil and dirt. Stainless steel instruction plates are conveniently mounted on either side of the pedestal and the foot pedal control of the machine is arranged so as to be readily accessible, regardless of the position of the operator in relation to the machine. Microswitch actuated, 24-volt solenoid valves with

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Trade Mark Reg. Patent Pending

OUNDRY & MACHINE CO.

Moy, 1946

MODERN MACHINE SHOP

sensitive pressure control offer automatic or controlled cycle of operation, as well as a means of synchronizing electric-air operated fixtures with the stroke of the tap head.

By means of the panel switches located on the side of the pedestal, the operator can readily select any one of three methods of cycle control. With the selector switches at one position, he may utilize piece part, whereby the insertion of the part into the fixture provides for actuation of the complete down and return stroke of the tap head. By turning the switches to the second position, the operator can control the cycle at all times. Regardless of the position of the tap head, release of the foot pedal allows its instantaneous return to the top of its With the selector switches in still a third position, the operator may obtain the advantages of a complete tapping cycle through momentary contact of the foot pedal.

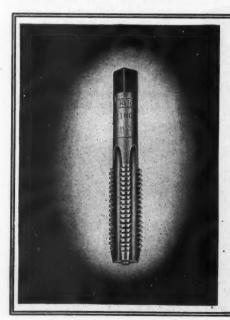
The Haskins Type UT Electric-Air Controlled Tapping Machine is available in three sizes: No. 1-UT with a rated capacity of No. 2 to A inch in mild steel; No. 2-UT with a capacity of No. 6 to A inch; and No. 3-UT with a capacity of No. 10 to % inch N. F.

#### Cincinnati Monoset Cutter and Tool Grinder

Cutter shapes involving convex or concave radii and having straight, tapered, or helical teeth can be quickly resharpened or ground from the solid without the use of special attachments on the Cincinnati Monoset Cutter and Tool Grinder, product of the Cincinnati Milling Machine Co., Cincinnati 9, Ohio. While the Monoset may be used for conventional resharpening of end mills, reamers, counterbores, form cutters and a multitude of special tools, it is particularly useful when it becomes necessary to quickly prepare special "trick" or "problem" cutters, special sized drills, and so on.

The flexibility of machine movements and many built-in features enable most jobs to be performed with a single chucking. By thus eliminating time consuming multiple setups, the cutter is produced very quickly and excellent concentricity is assured, with subsequent smooth cutting action and long tool life, the manufacturer states.

The generation of accurate radii is accomplished by the large, smooth action turntable base upon which the workhead



## REIFF & NESTOR TAPS

For better tapping at low cost use R & N the truly Modern Tap. They are ground from the solid High Speed Steel after hardening.

Our field engineers are willing and eager to assist you with competent counsel. Next time try R & N Taps.

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# yes... MARQUETTE has the LATEST DESIGN FEATURES



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amperes

Marquette's newly designed transformer gives INSTANT Arc Striking without extra high frequency or booster gadgets. Model 262-C has a wide range of 20 to 275 amperes and takes all welding jobs in stride from light gauges, jigs and fixtures to heavy dies, tools, cutters, etc. Expensive cutters, drills, punches, high speed tools, etc., can be quickly and inexpensively repaired "good as new" with Marquette Hardsurfacing Electrodes. Models: 262 and 262-C, 20-275 amps.; 261 and 261-C, 20-200 amps.

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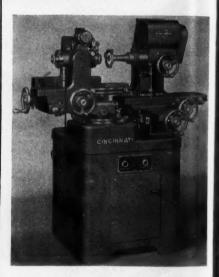


MARQUETTE WELDING EQUIPMENT SOLD EXCLUSIVELY THRU THE NATION'S LEADING DISTRIBUTORS



unit is mounted. The workhead may be swiveled through 235 degrees and adjust able stops are provided to accurately limit its arc of travel. An accurately adjustable transverse slide provides for the grinding of radii which have their centers offset from the center line of the workpiece.

An especially useful feature of the Monoset is the built-in spiral lead mechanism which provides a means of generating right-hand or left-hand spirals having leads as short as 118 inches. The various spiral leads are selected by a single simple adjustment, provided with a graduated dial, without recourse to complicated change gears.



Cincinnati Monoset Cutter and Tool Grinder

The workhead spindle is provided with a collet chuck, 13 straight collets ranging ½ to 1½ inches diameter, and 6 taper collets. An adjustable tail center support is provided for centered work and adjustable, spring tensioned stock supports are provided for uncentered work.

Accurate indexing of either straight or spiral fluted cutters is provided by a pair of easily operated workhead spindle indexing mechanisms. Straight fluted cutters, or other jobs not involving spiral leads, are indexed by a simplified ratchet type indexing device. Indexing of spiral fluted cutters is accomplished by a spring-pressed pawl type mechanism

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NATIONAL TWIST DRILL AND TOOL COMPANY ROCHESTER, MICH., U.S.A.

May, 1946

with interchangeable index plates.

Cylindrical grinding is made possible by the workhead spindle motor drive, which is supplied as standard equipment.

The grinding wheel spindle is supported by three sliding elements which permit the grinding wheel to be moved longitudinally, transversely, and vertically. The handwheel control for each slide is provided with a micrometer dial for accurate positioning of the grinding wheel, and ali slides are provided with adjustable micrometer-type stop dogs to accurately limit slide movements.

Convenient. easily read clearance angle scales are provided on the vertical and transverse wheelhead slides to simplify the grinding of tooth clearance angles. A two-speed drive for the grinding wheel spindle helps maintain correct cutting speeds with different sized grinding

A high speed spindle attachment for small mounted wheels provides a means for the performance of accurate internal grinding operations. This attachment is also extremely useful for jobs which re-

wheels.

quire the use of small diameter wheels in conjunction with either the workhead swivel or the spiral lead generating mechanism.

Simple, efficient lubrication of all slid-

ing elements is assured by a pair of "one shot" lubricating systems, and all operating mechanisms are fully enclosed to prevent entrance of grit and dirt.

#### Acme-Gridley Single Spindle "Chuck-Matic"

A 12-inch capacity single spindle automatic chucking machine to be known as the "Chuck-Matic" is announced by The National Acme Company, 170 E. 131st St., Cleveland 8, Ohio. Heavy duty, high production machining operations on castings, forgings, and tubing parts up to 12 inches in diameter can be effectively performed with the machine which specializes in straight, internal or taper boring, form turning or form boring, external turning, forming, facing and chamfering.

A single chuck holds the work and only two slides need to be tooled. Slide tools are mounted in the most accessible positions and the machining cycle may be instantly interrupted for resetting tools during setup by pushing lever, designated as "F" in illustration herewith, to stop feed and operating lever "R" to reverse slides. Finally, cams controlling working and clearance cycles of tools are



The Almond Three Jaw Drill Chucks were the first to be placed on the market. They were Pioneers in the field of Drill Chucks!

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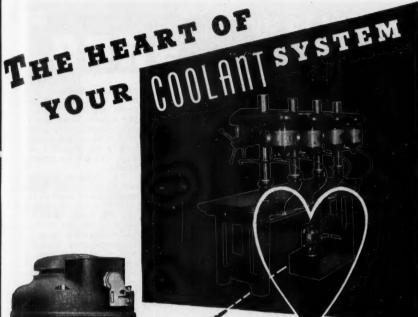
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\*Gusher Coolant Pumps assure you of:

ECONOMY—Uses less power when throttled, cuts operating costs.

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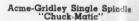
## THE RUTHMAN MACHINERY CO.

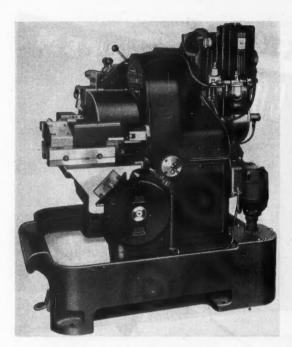
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THE "GUSHER"

A MODERN PUMP FOR MODERN MACHINE TOOLS

, 1946





placed where they are very easy to get at and set.

All controls are operated from the front of the machine and the work is also chucked from the front of the automatic. One person may operate as many machines as the cycle time of the job will permit; one machine is loaded while another is cutting. The chuck is positioned 41 inches from floor level, and the face of the chuck is but 14 inches from the front edge of the main splash guard. The slides are well retracted from the

chucking zone to rid that area of annoying obstructions during chucking. As the chuck jaws are opened and closed by air power controlled by a foot pedal, practically no physical effort is required to operate the chuck.

To obtain rigidity and simplicity, only two main castings are used in the construction of the Chuck-Matic. The heavy pan and onepiece frame are doweled and bolted together as a rugged, compact unit which with motors, toolholders, slides, and other essentials makes up a chucking automatic weighing 7,350 lb. and measuring 45 inches wide x 64 inches long x 64 inches high.

Three motors are used in the construction of the machine. Spindle and tool cutting movements are effected

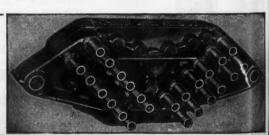
by a 15 h.p. motor mounted directly over the spindle at the rear of the machine. High speed clearance movements of the slides are controlled by a 2 h. p. motor and a ¾ h.p. motor operates the heavy duty pump employed to circulate coolant.

Cutting tools are mounted on the compound slide and cross slide positioned opposite each other on the frame of the machine. Solidly proportioned, these slides are set on an angular type base and supported in the frame without overhang. The compound slide at the right-hand

Pictured: a 24-Spindle Heavy-Duty Drill Head.

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DEEP HOLE DRILLS

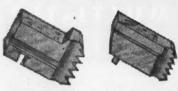
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side of the machine carries tools for straight or taper boring, form boring or form turning, drilling, reaming or grooving. Maximum boring length is 3½ inches—turning length, 4 inches. Endworking tools have a return distance for chuck clearance of 6 inches. Moving in two directions during the operating cycle, the compound slide approaches working position at high speed by moving longitudinally to the point where cutting is to start, then in toward the work. When ready to start the actual cut, slide movement is shifted to low working speed under power of the main drive motor.



Close-up view of Acme-Gridley Single Spindle "Chuck-Matic" showing massively proportioned toolslides designed to provide maximum support for carbide tooling

Located at the left of the automatic, the cross slide contains tools for forming, turning, facing and chamfering. The cross slide also approaches the chuck at high speed, shifting over into low working speed when the starting point of the cut is reached. A uniquely designed telescoping guard is used to prevent fine chips, dirt, and coolant from accumulating on slide ways, which are angled steeply to permit coolant to wash chips down easily into the pan. Wear on slide surfaces is compensated for through adjustable gibs.

Slide movements are controlled from cam drums located directly beneath the

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May,

# The Right BUR for the Job

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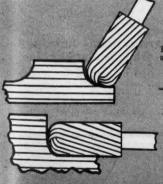
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Shape "D"

Cylindrical Ball Nose

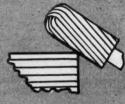
Aluminum, magnesium, brass and bronze foundries in particular find the P&W Shape "D" KELLER Bur ideal for finishing flat surfaces and irregular contours. It is also widely used in metal pattern shops for finishing fillets . . . and for breaking corners on irregular contours. Pratt & Whitney KELLER Burs are ground from the solid, by machine, which accounts for their exceptional smoothness of operation and long life. Ask us to send you complete information on this and other P&W KELLER Burs.



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The quick and simple way to break a corner,



May, 1946

MODERN MACHINE SHOP

slides. Cam drums can be pulled out on pilot shafts for convenience when set-ting cams. Positive stops are provided for all slides, with standard adjustable stops being employed to limit the longitudinal movement of slides. Double positive stops are used on the compound slide; in addition, there is a positive type stop on top of the compound slide. intended particularly for use in controlling depth during long boring cuts.

A three-jaw universal 12-inch swing chuck, controlled by a 12-inch diameter air cylinder, is used in the Acme-Gridley Chuck-Matic. To obtain proper chucking pressure for different jobs, a reducing valve and sight gage are included in the air circuit.

Mounting correct gears on the Shafts in the case above and to the right of the spindle provides a range of spindle speeds from 143 to 524 r.p.m. When desired, spindle speeds can be doubled by changing the motor pinion and driving gear. High and low speed cams are mounted on a disc at the rear of the machine. Quickly and easily accessible. they can be changed to obtain the same feed for a shorter cam rise, if the job requires it.

A Snap-lock limit switch is used to prevent the foot pedal from operating the air control circuit to open the chuck while the spindle is in motion. When air pressure falls below an established mimimum a safety valve operates to stop all machine movements.

Both the operator's hands are forced from the machining area when cutting action starts. He must push and hold the safety locking spring plunger with his left hand, and pull the starting lever with his right. Consequently the spindle of the machine cannot be rotated with the operator's hands still in the cutting zone.

In addition to the safety devices mentioned, there are a number of limit arrangements built into the Chuck-Matic to prevent damage to the machine itself.



No. 1 Friction Tapper drives from 2-56 tap to 3/4" tap in steel or any other material. Simple ad-

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in steel or other material. Floating Chuck Jaw automatically centers tap. Write for details.

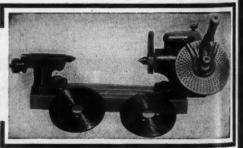
## Tavannes Single Spindle Automatic Screw Machine

Independent control of 12 individual working tools permits carbide tooling to be used for all operations common to screw machines in the Tavannes Single Spindle Automatic which is now being

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**Immediate Shipment From Stock** x2x3. Spindle has No. 7 B & S taper and take-up collar for end thrust. Threaded spindle nose 1½ dia., 12 thds. U.S.S. Plates cover entire range of B & S chart. Worm wheel ratio 40:1. Complete with 3 dividing plates, 4" dia., one 24-notch indexing plate and talistock. Write for catalog of machine tools and attachments.

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marketed by Commentry Industries, Inc., 280 W. Broadway, New York 13, N. Y. Available working positions are divided

Tavannes Single Spindle Automatic Screw Machine

into six stations for side slide operations, and six turret positions. Each of the six turret tools can be rotationed independently of the other when a turret containing spindles is in use.

Stock feeding in the Tavannes Automatic is performed by recoiling the headstock spindle back along the bar stock to the desired point of grip-

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ed point of gripping. The stock is then fed through a revolving guide bushing past the side slide tools and into the turret tools as they

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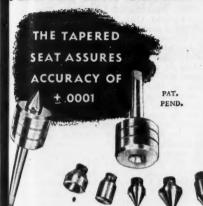
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- A. Very large, for pipe or tubing work
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they are interchangeable and are used for various operations. The set includes a wooden case which is handmade and rubbed to a fine finish. Each tool fits snugly into its own recess. . . safe and readily available when needed.

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For convenience and utility, we recommend the *Empire* Toolmaker's Set. Available in seven standard sizes. Special sizes made to specifications.

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CONOMY—As compared with dead centers, application of an Empire Live Center will return its original cost in a few weeks. Burnt-out and scored center holes are eliminated. Work is turned at higher speeds; heavier cuts are made.

VERSATILITY WITH ACCURACY — Points and case are fireaded and have matched tapered seats. When a point is seeded for an operation, it is tightened on the case. Perfect dignment is obtained by the matched tapered seats. Tension of the threads maintains this perfect alignment.

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are sequenced into working position. Feeding tension on the bar is maintained by an electric servo motor.

Since the guide bushing is located very close to the point of cutting action, unusually long work can be machined effectively without the use of separate stock rests. Close size tolerances can also be held since the work is constantly supported at the point of maximum cutting pressure. Turning-behind-shoulder work and the generation of complex shapes are also simplified by this method of turning.

The Tavannes Single Spindle Automatic Screw Machine is built in two capacities; the M-40 accommodating bars up to 1% inches in diameter and the M-60 handling 2%-inch diameter bar stock. The maximum turning length with standard tooling is 7½ inches, and a special tooling arrangement permits work up to 9 inches in length to be turned. Fifty-one spindle speeds are available, with the minimum speed in the M-40 model being 90 r.p.m. and 64 r.p.m. in the M-60. The maximum spindle speed for the M-60 is 1,523 r.p.m. while that of the M-60 is 1,523 r.p.m. A 4 h.p. motor is used in the M-40 and a 4-6 h. p. motor in the M-60. The weight of each model is 5,500 pounds.

## Springfield Hydraulic Profiling Machine

The Springfield Machine Tool Co., Springfield, Ohio, announces a hydraulic profiling and duplicating machine of simple construction and versatile operation. It is shown herewith as an integral part of a Springfield 20-inch medium duty lathe on an 8-foot bed. However, other sizes are available, depending upon the size of the work.

size of the work.

According to the manufacturer, the Springfield Hydraulic Profiling Machine can be used to duplicate any job from bottle molds to complicated cam forms and to make either interior or exterior duplications. Any type of template may be used—a round type rotated between centers at the rear of the machine, a flat template held stationary between centers, a formed flat template mounted directly to one of the brackets. Two brackets are standard equipment and these are adjustable on machined and hand scraped ways on the rear of the bed. Templates requiring rotation are driven by means of an adjustable chain drive directly off the spindle, and the drive mechanism is amply guarded by means of a sturdy metal guard.

Twelve spindle speeds can be obtained



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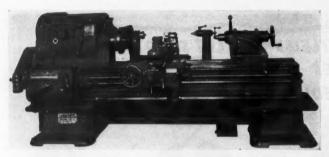
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May, 1946

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MODERN MACHINE SHOP



Front view of Springfield 20 - Inch Lathe equipped for hydraulic duplicating and tracing

by three levers located on the front of the headstock. These speeds can be further reduced, when required, by means of a two-speed motor. The various feeds are obtained in the usual manner through a standard gearbox.

Most of the duplicating mechanism is carried on the cross slide which is designed to overhang the rear of the bed enough to mount the stylus control valve on top of the slide. This valve swivels to accommodate the various contours which may be encountered in the many different design requirements. On the underside is mounted the master hy-

draulic cylinder, which is controlled by the stylus, for duplicating work running parallel to the machine spin-

dle. Another master cylinder is furnished for duplicating work which runs at right angles to the spindle. This cylinder is attached to the cross slide inside the machine ways.

The hydraulic pump unit, including oil tank, motor, pump, relief valve, and presure gage, is separate and may be located convenient to the machine. Flexible pressure hose connects the pump with the master cylinder and control valve stylus.

To operate the machine tool on regular lathe work, the profiling arrangement can be readily disengaged and the regular cutting tool inserted. The usual stop



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The real value in a diamond is determined by the number of truings obtained per dollar invested.



GILMORE DIAMOND TOOLS are designed and priced to reduce the cost per dressing.

Write for Catalog No. 45

## F. F. GILMORE & CO.

285 Columbus Ave. Boston 16, Mass.

collar on feed rod will disengage feed at any predetermined position.

The simplicity of the machine, its versatility of operation, ease of control and quick change-over from profiling to regular lathe work recommend it for all types of die and duplication operations, as well as turning work.

## Motor Tool Multi-Spindle Tapping Machine

A bench type multi-spindle tapping machine, the head of which is readily interchangeable, has been introduced by the Motor Tool Manufacturing Co.. 777



Motor Tool Multi-Spindle Tapping Machine

Cortland Ave., Detroit 4, Mich. The head and spindle assemblies are constructed as a complete unit, each specially designed to perform specific tapping operations. The head assembly can be quickly and easily attached or detached, and any number of spindles may be incorporated in the head, and any pattern, provided they are confined to a 10 x 12-inch area. Center distances between spindles can be held as close as 1 inch.

According to the manufacturer, the

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as well

costs Expected to
Increase 25% over
Increase 25% over
1939" "STEEL" Magazine
1946
TE

GET YOUR
MACHINING COSTS

DOWN with
TECO Comented Carbide



MORE PIECES BETWEEN GRINDS

MORE GRINDS PER TOOL

LESS DOWN TIME

LOWER TOOL COST

TEGO Cemented Carbide combines hardness, toughness and breakage resistance to a degree never before obtained in a cutting material. It holds a cutting edge longer and produces far more work than any similar material.

To prove how TECO gets machinery costs down to rock bottom—make this convincing test: Replace a few of your present carbide

tools, on any job, with harder, tougher, more uniform TECO. Then check the output per tool. You'll get a new idea of what a carbide cutting tool can do!

TECO Cemented Carbide Tools, in all standard grades, sizes and styles, are available for immediate shipment. Latest catalog and price list sent on request.

CEMENTED CARBIDE

Pioneers in Tungsten Carbides

**TECO Cemented Carbide Blanks** 

Immediate delivery on full range of standard sizes, grades and styles.



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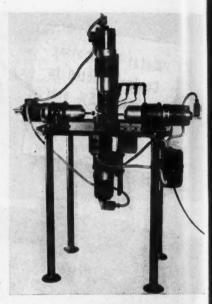
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head of the Motor Tool Multi-Spindle Tapping Machine is so geared that a uniform flow of power is delivered to each individual spindle and tap. All gears are specially hardened and operate in a bath of oil, fed by a continuous-flow motor-driven oil pump. Each spindle likewise is hardened and ground, with the thread of same operating in a bronze bushing. Operating speed is optional in a range from 220 to 760 r.p.m. as standard for each tap. Spindle speeds, however, can be varied either higher or lower, according to requirements, by simply changing the stepped pulley of the machine.







Simplex Special Four-Way Drilling Machine

#### Simplex Special Four-Way Drilling Machine

The accompanying illustration shows a hydraulic setup for the simultaneous drilling of four holes in a cold-rolled steel part. The part is loaded in the sliding fixture located centrally in respect to the four automatic drilling units.

Produced by the Simplex Tool Engineering Co., 2540 Park Ave., Detroit 1, Mich., the machine is said to be capable of drilling four holes in the time ordinarily required for drilling one hole.





20" long x 12" wide x 61/2" deep.
16 ga., drag holes and handles both ends.

J. L. LUCAS & SON, INC.
Bridgeport, Conn.

# Speed PRODUCTION UP TO 25% WITH

# MOTORS AND DRIVES

FOR LATHES • SCREW MACHINES

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In most cases we can deliver within three or four weeks. And that means early speed-up of your production, thanks to modernization of your present equipment. With Torq drives and motors you may speed production up to 25%, and make the change-over so easily you lose no valuable production time in waiting. You will be prepared for post-war with completely modernized equipment.

**ELECTRIC MOTORS:** Totally enclosed, fan-cooled, anti-friction bearings.

TORO-QUA-MATIC DRIVES: 4 selective speeds, 1 to 15 H.P., alloy steel gears, anti-friction bearings. Proven design . . . improves production up to 25%.

## NOTE THESE LEADING USERS

Listed here are a few of the leading American War Plants which successfully use Torq Motors and Drives: White Motor, Cleveland Cap Screw, Cutler-Hammer, Republic Stamping, Valley Mould & Iron, H. B. Sacker Mfg. Co., Thompson Products.

Write for descriptive catalog.

THE TORQ ELECTRIC



MANUFACTURING CO.

May, 1946

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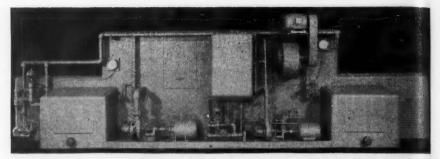
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1946

MODERN MACHINE SHOP



Howard Conveyor Type Cleaning Machine

All drilling units are controlled from a single push-button station. The drilling units shown are made in progressive sizes for drills from No. 50 to ¼ inch.

## Howard Conveyor Type Cleaning Machine

The Howard Engineering and Manufacturing Co., 2278 Buck St., Cincinnati 14, Ohio, has developed a conveyor type

cleaning machine specially designed for removing scale from welded seams of automotive parts; namely, rear axle housings each consisting of two formed halves which are seam welded together. To remove the loose scale formed on the interior of each housing near the welds, the part is conveyed through the machine on a belt with an indexing arrangement that stops the housing at one station where a revolving steel brush enters the housing to brush loose the scale. At the same time, cleaning solution is fed

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Sub-Presses Reduce Hand Finishing

> Available in arch and overhanging types in 10 diameters up to 6".
>
> Alignment is attained for precision and

precision and clean work.

Lower costs through s a vings in time and effort.

Arch Type Press

SEND SAMPLES OR DRAWINGS FOR ESTIMATE.

## **WALTHAM MACHINE WORKS**

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Massachusetts

# East TO AVOID Oversize



When oversize and bellmouthed holes are caused by the work being out of alignment with the spindle, the trouble can be remedied by using a Ziegler Floating Holder in place of an ordinary holder. It's as simple as that!

Prove this to yourself by changing over to the Ziegler on your next tapping or reaming job.

W. M. ZIEGLER TOOL CO. 1924 Twelfth St., Detroit 16, Mich.

Riegler WAITE FOR .

POLICE FLOATING HOLDER



It's easy to save time and money by using Siewek clamp assemblies and parts instead of designing and producing special fixture clamps and fittings. Usually a Siewek clamp does the job-with only a minimum of details required in fitting. Remember, you can buy these complete assemblies for less than the cost of designing.

Every Siewek clamp provides secure holding through uniform right angle pressure. Heat-treated and hardened Siewek clamp bars last for years—with an ample margin of safety.

Write today for full size template drawings for layout use.

## SIEWEK TOOL DIVISION · DOMESTIC INDUSTRIES, INC.,

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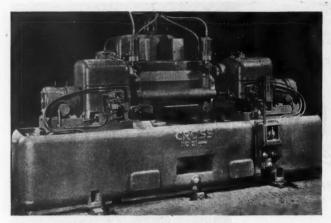
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Cross Shaft Facing and Centering Machine

drying operation. Operation of the brush into and out of the housing is by an air cylinder operated in con-junction with the indexing of the

The Howard Conveyor Type Cleaning Machine is furnished completely piped for steam, air, water supply, and drain-

age. Connection of the four services and electrical power complete the installation of the machine in the plant.

through and around the brush as well as on the exterior of the axle, flushing away the scale and other foreign matter. At the second station, the housing is dried with hot air.

The conveyor belt of the machine incorporates fixtures that are designed to hold each axle housing in the correct

## Cross Shaft Facing and Centering Machine



MODERN MACHINE SHOP

Write for Bulletin No. 381 On This New 15-Ton General Flexible Power Press

This is a new model—improved press. Write for Bulletin No. 381 describing it.

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General Flexible Power Presses—capacities 5 tons to 60 tons have instantly flexible power.

They give you as little or as much power as you need by simply "stepping" very lightly or a little heavier on the Foot Control Pedal. • How EASY this makes the job of STRAIGHTENING parts after heat treating or before machining. • Inexperienced operators can quickly learn to keep ahead of production requirements.

• FLEXIBLE POWER Presses are also being used in production for Push Broaching, Assembling, and many other Pressing Operations.

GENERAL MANUFACTURING CO., 6438 Farnsworth Ave., Detroit 11, Mich.



GENERAL HEXIBLE
POWER PRESS

Co., Dept. 73, Detroit 7, Mich., for facing and centering shafts in sizes from 1½ to 6 inches in diameter x 9 to 48 inches long. In this design, maximum cutting rigidity is said to be attained by supporting the work, regardless of length, and the cutters at the point of cut.

The machine operates in a fully automatic cycle controlled by a push button. The shafts are rolled onto loading rails into the clamping jaws and hydraulically clamped on each end. The work is then fed up so as to provide for the milling of both ends. Following this, the carbide cutters are retracted and the work lowered for centering and unloading.

According to the manufacturer, 50 average shafts can be faced and centered on both ends in one hour with the machine. The hydraulic feeding and traversing heads connected with the work clamps are quickly and easily positioned in changing from one size of shaft to another, the average change-over time being 10 minutes.

## "Thermonic" Multi-Turn Split Coil

The induction hardening of localized surfaces of such parts as crankshafts, camshafts, and similar components is said to be greatly simplified through the use of the Thermonic Multi-Turn Split Coll developed by the Induction Heating Corp., 389 LaFayette St., New York 3, N. Y. The coil consists of two or more turns, made up of machined copper plates, which are split and hinged in such a manner as to allow the coil to be opened, the work inserted in place, and the coil closed and clamped, automatically making contact between the segmental sections to provide a continuous path for current flow. The segments of the coil are held in relationship to each other by an insulating retainer ring which runs around the outside of the coil proper and forms a closed passage between the coil turns.

When hardening operations are to be performed by the use of the Thermonic Multi-Turn Split Coil, this chamber can be utilized to carry the quenching medium to the heated metal without removing the work from the coil, thus eliminating the time delay between the end of the heating process and the start of the quench. In this manner, full advantage of the surface effect of high-frequency induction heating can be obtained since excessive thermal induction into the heated part is prevented, it is stated. Moreover, since both the coil segments

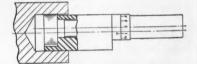
# NEW INDICATOR PRECISION GAGING of INSIDE DIAMETERS WITHOUT USE of BULKY, DELICATE INDICATORS . . . The COMAL Gage



PATENT PENDING

Less-skilled operators now can experily gage inside diameters on the machine during production, or on final inspection—without "feeling" or "rocking." The COMAL Gage definitely eliminates guessing, bulky, slow and time-wasting methods.

FAST, SIMPLE, ACCURATE—Constant rise radius part contacts high and low points of inside bore diameters. Rotation of knurled handle gives calibrated readings instantly to indicate over or undersize, out-of-round or taper conditions (example: .001 variation of work diameter records "4" calibration. Half, three-quarter inch or wider calibration for .001 variation can be had for closer reading.)



COMPARE THESE FEATURES — Indicator precision—low cost—sturdier construction — faster — simpler — foolproof — compact — lighter — easier to handle — no accessories.

SPECIFICATIONS—Available in sizes from ½" diameter up. Made for deep or shallow holes. Calibrated in thousandths—parts of thousandths—or "tenths."

WRITE TODAY FOR QUOTATION giving bore diameter, depth, and calibrated reading desired.

PROTECTED SALES TERRITORIES AVAILABLE.

THE COMAL GAGE & MACHINE CO., 2819 Jay Ave., Cleveland 13, Ohio

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Here is an air cylinder so radically different from conventional design that we call it an air "motor". It is not a rotary motor, but a double-acting, reciprocating power unit, complete within itself, with built-in valve, valve operating lever, and stroke speed controls. No separate valves or controls to buy! No intricate and cumbersome piping to install! Only one air connection is needed. Operates on any air pressure up to 175 lbs. The Bellows Air Motor is compact, sturdy in design and construction. Stroke lengths available 1" to 48".

Patents and Patents Pending

Bellows Air Motor, Model BM5-Power approximately five times operating air line pressure. Standard models equipped with nose and foot mountings. Swing or pivot mounts on order. Solenoid-controlled motors, continuous action motors, and remote control motors also available.

Bellows Air Motor, Model BM10-Power approximately ten times operating air line pressure. Foot mounts standard equipment. Swing or pivot mounts on order. Solenoid-controlled motors and remote control motors also available.

## Bellows co. E. TALLMADGE AVE., AKRON, 10, OHIO

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and the supporting leads are independently water cooled, the coil may be used without internal quenching, thus permitting continuous operation.

The Thermonic Multi-Turn Split Coil is said to be particularly useful for crankshafts where each journal is hardened individually; camshafts where the shaft is progessed and each cam is placed successively in the coil; shafts having large sections or flanges at their ends; and brazing and annealing sections which require split-type coils. According to the manufacturer, power concentrations as



"Thermonic" Multi-Turn Split Coils

high as 20 kilowatts per square inch on 1/4-inch diameter shafts are made possible by the use of the coil, thus resulting in hardened ases of 0.020-inch thickness when us d with induction-heating equipment has ng an output frequency of 375,000 cycles.

## LEWTHWAITE MACHINE CO.

FRONT LEVER BENCH PUNCH

Capacity 7/16" hole through 1/4" steel or equal .

Round, square, flat, and oval shaped punches and dies stocked

Send for circular illustrating and describing this machine.

317 East 47th St., New York 17



An improved wet belt surfacer incorporating features which provide for increased output has been announced by the Porter-Cable Machine Co., Syracuse 8, N. Y. Designated as the Model BG-8, the machine is equipped with a large capacity recirculating tank for long operational performance. The coolant, applied to work and belt with a spray nozzle, maintains the work in a constantly cool condition and prevents weakening of the structure of such materials as plastics, rubber, ceramics, glass, and



# GOOD GEARS O

All Kinds-Any Quantity AT THE RIGHT PRICE

THE CINCINNATI GEAR CO. Woester Pike

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# HYDRAULIC

## **FEATURES**

- Infinitely Variable Longitudinal Traverse
- Hydraulic Cross Feed
- Coolant
- Precision Spindles
- Heads Swivel For Angle Work
- **Grinding Heads To Convert** For Internal Grinding (See Cut)

## EG103 SPECIFICATIONS

ork Capacity—3" Dia. x 10" Length orkhead Accommodates—Collets 1" Max. Hole —Chucks & Face Plates 4" Max. or Space & Wt.45"Long x 25" Wide-1600 lbs.

THE GRENBY MANUFACTURING COMPANY

LAINVILLE, CONNECTICUT



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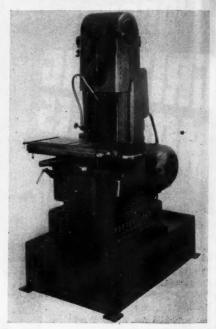
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tempered metals, it is claimed.

The depth of the machine has been reduced from 621/2 to 48 inches to conserve space. The work table of the BG-8 is 38 inches from the floor in contrast to the previous distance of 401/2 inches.

The heavy base of the BG-8 is constructed to provide rigid support to the work table and the automatic feed table. A flat, hardened steel platen is used to back the belt during the grinding operation. The standard platen measures 9 x 12 inches and the working area of the standard table is  $17\frac{1}{2} \times 11\frac{1}{4}$  inches. An



Porter-Cable Model BG-8 Wet Belt Surfacer

abrasive belt 8 or 9 inches wide x 107 inches in circumference can be used. Moreover, resilient platens can be used on the Model BG-8. Such platens are used when the surface to be ground need not be perfectly flat or parallel with other surfaces. They are also used when surfacing or grinding concave or convex surfaces.

Additional specifications of the machine are as follows: automatic feed table working area, 111/4 x 241/2 inches; abrasive belt speeds 4,100 s.f.p.m. standard, 2,500,

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More Speed...
LONGER DRILL LIFE
with CONTINENTAL'S
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aster drilling action and rolonged tool life are but two many advantages obtained with the Continental Drill Chip reaker. By breaking chips into mall, uniform pieces that are asily carried up the flutes of he drill, clogging is elimiated. The unit can be used ertically, horizontally, or at ny angle as long as the housng can be kept stationary hile the drill rotates. The arm revents rotation of the housng. Where space permits, the ontinental Drill Chip Breaker on be used in multiple spinle heads. Write for Continental ulletin 28161 for sizes, complete pecifications and 7 ways o profit by this new ontinental product.



easily carried up

the flutes. Holes

are straighter,

rounder, and have

better wall finish.

CONTINENTAL TOOL WORKS

DIVISION OF EX-CELL-O CORPORATION
1200 OAKMAN BOULEVARD • DETROIT 6, MICHIGAN

3,550, or 4,600 s.f.p.m. optional; motor speed, 1,725 r.p.m.; drive unit; 5 h.p. 220/440, 60 cycle, 3 phase (7½ h.p. motor optional); shipping weight, 2,060 lb. with automatic feed table.

#### Industrial Elevating Table

The Industrial Elevating Table illus-strated herewith, product of Montgomery & Co., Inc., 53 Park Place, New York 7, N. Y., is made of steel throughout and is designed to safely carry and lift a maximum load of one ton. Sturdily built and arranged so as to remain fixed in any



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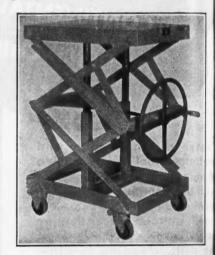


e Pioneers in the riveting field. Head rivets from smallest to %" diameter, either by noiseless spinning or vibrating hammer method.—Sizes to meet all needs.—Types include Vertical and Horizontal Multiple Spindles. Write for literature—and don't forget to send samples.
THE GRANT MFG. & MACHINE CO.

96 Silliman Ave.

Bridgeport 5, Cor

desired position, the unit is readily portable and is said to be particularly useful in removing dies from storage shelves, conveying and placing them in presses; supporting and leveling large overhanging pieces of work on drill presses, and so on; rearranging punch press mold dies and other heavy parts on shelves in stockrooms; and transferring heavy work from horizontal mills to drill



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Industrial Elevating Table

Specifications of the Industrial Elevating Table are as follows: minimum height from floor, 26 inches; maximum height from floor, 43 inches; raise per revolution of handwheel, % inch; diameter of two ball bearing swivel and two stationary casters, 4 inches; dimensions

SEND US YOUR PRINTS FOR Quotations

THREAD GRINDING BROACHING AAGNETIC INSPECTION



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MODERNIZE NOW

Recognized As
STANDARD EQUIPMENT
In up-to-date plants, coast to coast

Duty . . . Self-Indexing

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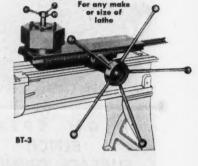
replace worn or inaccurate turrets and to ert Engine Lathes for Speedy, accurate Turret

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alt or Bolt Mounting 31 (51/4")

To cut Set-up time and increase Production. Takes extra heavy cuts.



#### YNN No. 2 HYDRAULIC DRIVE

For operation of All Standard Make Turrets 10" Travel or Less.

#### SPECIAL FEATURES

table unit—shift it from one machine to another

tomatic control—full variation of feed for each tool

justable rapid tool approach to cutting point plus quick

fect cushion effect for tools—this avoids breakage ple Set-up without Cams th greater production per unit

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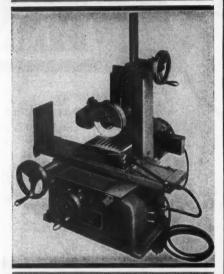
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### SANFORD



HIGH SPEED BENCH SURFACE GRINDER

ACCURACY WITHIN .0001

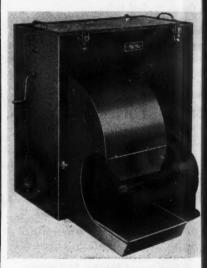
A sensitive, highly accurate, machine specially designed "For The Job That Fits in Your Palm"

Write for Bulletin

SANFORD MFG. CO. 1020-28 COMMERCE AVE. UNION • NEW JERSEY of table top, 20 x 32 inches; overall width of table, 26 inches; weight (crated), 20 lb.; capacity of table, 2,000 pounds.

#### "Dustkop" Model 421 Dust Collector

Unusual portability for a completely self-contained dust collector, which requires no installation other than the mere placing of the unit in position on the bench and plugging into the lighting circuit, is a feature of the newest addition to the line of "Dustkop" industrial dust collectors offered by the Aget-Detroit Co., 602 First National Bldg., Ann Arbor,



"Dustkop" Model 421 Dust Collector

Mich. In addition to the customary motor-driven fan, cyclone separator, and filter, the unit, which is designated as the Model 421, incorporates a grinding wheel hood which is built as an integra part of the unit.

Though designed primarily for bench type dry grinding of a precision nature the dust collector has, due to its design a wider range of uses. Buffing, polishing, and similar work which produce great amounts of long stringy material lint, bristles, and so on, can be easily handled, it is claimed, since the unit is equipped with a self-clearing paddle wheel fan. A removable pan in the grind

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e unit is g paddle the grind May, 1946 "AMERICAN SWISS" Swiss-Pattern FILES rite their own testimonials At the plant of a metal specialty manufacturer: "AMERICAN SWISS" Swiss-Pattern Files outfile and outlast all other makes that we CATALOG have tried." ON REQUEST

The ability of "AMERICAN SWISS" Files to outperform is the natural result of the way these precision tools are made. Their size is held to close limits—with a tolerance of only ±.002" in some shapes. Their uniformity of hardness is assured by heat treatment with automatic control and regulation to within ±5° F. And every step in their

manufacturing process is conducted by long-skilled craftsmen guided by 45 years of experience in specializing on Swiss - Pattern Files.

Buy from our Distributor.

American Swiss File & Tool Co. Elizabeth 1 **New Jersey** 

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ISS PATTERN

ing wheel hood allows sludge from wet grinding operations to be emptied separately, thus keeping it out of the collector. A baffle plate in the hood prevents small work from being drawn by the air suction into the fan and at the same time spreads the effective area of the suction.

Where the Dustkop Model 421 is to be moved about, it is available with a 110-volt motor so that the electrical connection is made merely by plugging into the lighting circuit. However, the unit is available for operation on other voltages when required and where the installation

is to be of a permanent nature.

Two stages of air cleaning are incorporated in the Model 421. The first stage, claimed to remove all of the heavier dust and dirt as well as lint, bristles, and so on, is afforded by means of the cyclone separator. The second stage comprises the fire-safe spun glass filter which gives the air a final cleaning to remove the finer particles of dust before the air is returned to the room.

Reclaiming precious metal dust is simply a matter of removing the collected dust from the unit and melting the finer particles out of the spun glass filter material, which is easily replaceable.

Maintenance is chiefly a matter of turning a hand crank which shakes the finer particles out of the filter material when the latter loads up after extensive use.

### Lord & Davis Improved Supersensitive High Speed Drill Press

An improved design of its Lord & Davis Supersensitive High Speed Drill Press for drilling small diameter holes is announced by the Massasoit Machine Co., 222 Grove St., Waltham, Mass. The speed of the new model has been increased from 23,000 to 25,000 r.p.m. A backshaft and idler pulley have been eliminated so that there are less moving parts. A lighter chuck with internal taper hole, as well as a spring which raises the spindle, is used to make the operation of the machine more sensitive. More needle bearings are now used in the spindle to provide greater accuracy.

The main feature of the drill press is its Supersensitive operation. A floating spindle, driven by a lightweight woven endless round cotton belt, is operated by a Supersensitive feed control lever so





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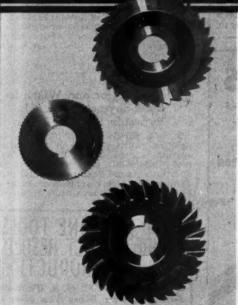
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## **Particularly** For



The men who plan production have found that Union Tools fulfill their most exacting specifications for precision-plus productivity. Union Tools are designed particularly for these exacting planners . . . made to make it easier for them to stick to their schedule of production and maintain their standards of accuracy.

#### UNION TWIST DRILL CO. MASS.

ATHOL

S. W. Card Mfg. Co., Div., Mansfield, Mass. Butterfield Div., Derby Line, Vt. Butterfield Div., Rock Island, Quebec.

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UNION \* BUTTERFIELD \* CARD Divisions of the Union Twist Drill Company

that the drill may be fed with only an ounce of pressure. The leverage is computed so that the operator can easily apply the correct amount of pressure to the drill, and the machine is said to be so sensitive that the operator can readily determine cutting action of the drill.

The Lord & Davis Improved Drill Press requires a bench space of 18 x 12 inches and measures 15½ inches in overall height. The size of the work table is 8 x 4% inches and the maximum feed of drill is ¾ inch. A 1/5 h.p. Universal motor with a speed of approximately 16,000 r.p.m. is used to provide four standard speeds of



Lord & Davis Improved Supersensitive High Speed Drill Press

EARS IN STOCK

Gears, speed reducers, sprockets, thrust bearings, flexible couplings, pulleys, etc. A complete line is carried in our Chicago stock. Can also quote on special gears of any kind. Send us your blue prints and inquiries.

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440-450 N. Oakley Blvd., Chicage 12, III.

7,600, 11,500, 17,400, and 25,000 r.p.m. Different speeds are obtainable by changing the drive pulley size. If greater versatility is required a rheostat may be used.

The improved drill press is said to be of the improved drill press is said to be of the drive of the improved drill press is said to be of the improved dril

The improved drill press is said to be of special interest to instrument makers and industrial manufacturers whose products require accurately drilled holes in sizes from 0.004 to h inch.



FOR MORE TOOL MILEAGE



UTICA DROP FORGE AND TOOL CORPORATION UTICA, N. Y.

#### Die Separator and Winch for Lyon-Raymond 2,000-Lb. Hydraulic High-Lift Truck

Since a popular use of its 2,000-lb capacity high-lift truck is in die handling operations, the Lyon-Raymond Corp. 2616 Madison St., Greene, N. Y., is offering optional features for the truck designed with this application in mind. Included is a die separator which con-

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Specify "QUALITY" H. S. Woodruff Keyway Cutters When You Have a Trugh Inh To Lick

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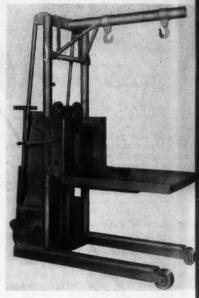
MODERN MACHINE SHOP

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sists of a removable boom with adjustable hooks. The top section of a die fastened by chains to the hooks and the lowering of the platform provides for the separation of the two sections of the difference in the boom is a "hook-over" type requiring no bolts for attachment.

For pulling dies and fixtures in and of racks and presses, a gear type wind with a ratio of 38 to 1 is also available. The winch is designed for bolting to the back plate of the platform. Both the winch and the die separator may be further than the diese parator may be further than the diese parat



Lyon-Raymond 2,000-lb. Hydraulic High-Li Truck Equipped with Die Separator and Wind

nished with a standard model truck of added to it after it is in use.

The accompanying illustration shows Lyon-Raymond High-Lift Truck with motor-driven hydraulic pump. A han pump is also available.

#### Hub Power Press

Capable of handling brass, sheet meta or plastic with equal facility, the Hu Power Press illustrated herewith, produc

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The Wheel Trueing line of diamond wheel dressing tools includes standard and special types for every use, many of them being original developments by Wheel Trueing laboratories and made exclusively by Wheel Trueing.

High-grade small diamonds are always more plentiful than high-grade large diamonds. By developing methods of setting these high-grade small diamonds so that dressing action is spread over several points the excellent characteristics of these stones is fully utilized, giving exceptional efficiency at low cost.

This is one reason why Wheel Trueing tools have become known throughout the world for the uniformly high quality of the diamonds and for the resulting high efficiency of the tools themselves. We invite your inquiries regarding any wheel dressing problem.



High-Li

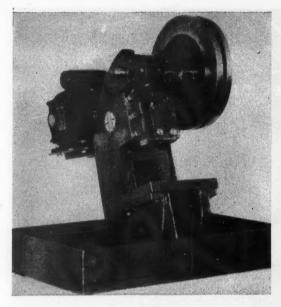
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of the William F. Brewer Machine Co., 75 Laurel St., Hartford 6, Conn., can be used in performing stamping, punching, and riveting operations. Mounted on a steel table, the machine is controlled by a foot lever, thereby allowing the operator free use of both hands for stock han-

In addition to the foot control, construction features of the Hub Power Press include a V-belt drive, 50-lb. flywheel, parts bin, and steel table. Specications of the machine are as follows: capacity, 4½ tons; stroke, 1 inch; die space, 6 inches; height, 51 inches; shipping weight, approximately 300 pounds.

#### Lanco Type VV Die Head

Supplementing its present line, the Landis Machine Co.. Waynesboro, Pa., announces the availability of a new series of Lanco hardened and ground die heads designated as the Type VV. The Type VV head is available in 1, 1% 2, and 21/2-inch sizes for use on hand-operated threading machines and is especially recommended for threading alloy steel and for work which must be held to extremely close tolerances. All parts of the head are of special alloy steel, precision ground for maximum accuracy.

The chaser holders of the Type VV die head are clamped to slides of heavy cross section to assure maximum rigidity. The manner in which the chaser holders are clamped to the holder slides per-

mits the removal of the holders from the face of the head for interchange without disassembling any part of the head or removing the head from the spin dle. The chaser holder slides are gibbed to the head body to provide compensation for wear.

Having unusually few operating parts the Lanco Type VV Die Head is of enclosed design so as to prevent the entry of chips or dirt and thus assure maximum life. Zerk type fittings are provided to force heavy grease into the chaser slides and other operating parts so as to prevent the entry of fine cuttings which would cause excess wear

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Your finely machined parts, ends, exposed openings, threads, etc., deserve efficient safeguards from dirt, grit, and rust in storage or transit.

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Extremely fine adjustment for size with the head is obtained by means of a graduated adjusting ring located at the rear of the head. Adjustments to fraction of a thousandth of an inch can be obtained.

The Lanco Type VV Die Head employs the Lanrac chaser and chaser holder combination which includes a rack tooth arrangement for quickly locating the chaser in its approximate position, after which an adjusting screw operating against the chaser clamp is employed to advance the chaser to the correct gauge setting position. The Lanrac type chaser has rack teeth milled on the offset seating surface of the chaser for its full



## M - D Facing Heads

Can be attached to Boring Mill Bar, and Drilling or Milling Machine spindles. Single point tool travels radially from center outward or reverse, feeds automatically. Sizes 6" to 46" diameter.

Write for circular.

MUMMERT-DIXON CO.
120 PHILADELPHIA ST. HANOVER, PA.





Lanco Type VV Die Head installed on threading machine

length, and these rack teeth engage a short section of mating teeth on the chaser clamps. The chaser clamp is hed onto the chaser holder by means of a clamping screw which extends through an elongated slot in the clamp, the slot being of sufficient length to permit a lateral movement of the clamp slightly greater than the pitch of the rack teeth on the chaser. This clamping arrangement is said to permit adjusting the chaser to the proper gauge position with no more than two or three turns of the adjusting screw, thus saving considerable time in interchanging chasers.

#### Rapids-Standard "Press-veyor"

A portable power-driven endless belt conveyor which is compactly and ruggedly constructed of heavy gauge formed



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May, 1946 May, 1946

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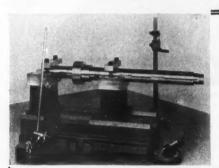


Rapids-Standard "Press-veyor"

steel and steel tubing to withstand the abuse of pressroom operations, to be known as the "Press-veyor," is now being manufactured by The RapidsStandard Co., Inc., 440 Peoples National Bank Bldg., Grand Rapids 2, Mich. The wide base of the unit provides maximum stability and is said to eliminate the hazard of tipping. In addition, the two-wheel design of the base allows the conveyor to be moved about easily.

The Press-veyor includes a strong 32-oz. four-ply canvas belt which is stitched with heavy twine and impregnated to make it pliable, waterproof, and weather-proof. The belt cleat construction employed is said to eliminate many maintenance hours and ensures uninterrupted conveyor operation. The Press-veyor is readily adjustable at both delivery and receiving ends over a wide range of operating positions, and is equipped with lifting handles at both ends so that it can be quickly raised to any desired delivery position. The conveyor is held in the adjusted position by means of quickacting locking screws.

The Rapids-Standard Press-veyor is available in two standard models; namely, a 6 and an 8-foot model. The 6-foot model is adjustable up to a 39-degree maximum operating pitch and is available in two widths of 15% inches using a 12-inch belt and 20 inches using a 16-inch belt. Power is supplied by a 1/3



## 7he Hartford V-BLOCK Fixture

Illustrated at the left is the HART-FORD V-BLOCK FIXTURE adapted for inspection work. Parallelism of bored holes, hole spacing and milled

faces can be checked accurately on the HARTFORD V-BLOCK FIXTURE. Also a great time-saver on milling, boring and drilling. Simplifies tough setups, is practical and convenient for locating and holding a wide variety of irregular shaped work. Simple in design and rugged construction helps make the HARTFORD V-BLOCK FIXTURE a worthwhile investment in any machine shop.

Write for illustrated circular.

THE HARTFORD SPECIAL MACHINERY CO.

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#### NEW AGITOR PARTS CLEANING SYSTEM

Cold Cleans 4 Better Ways

Removes Cutting Oils, Greases, Lubricants and Sludges . . . for Machine Shops, Metal Shops, Auto Shops and Tool Rooms

Only AGITOR gives you 4 cleaning actions .. each with a definite function to clean laster . . . more efficiently . . . unattended in operation.

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SWIRLING AGITATION—Flushing action of solvent in tank cleans soaking parts.

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h.p. right angle gear head motor ope ating on 115, 220, or 440 volts.

The 8-foot model is adjustable up a 44-degree maximum operating pitc and the widths and belt sizes are the same as for the 6-foot model. The mote is a 1/3 h.p. right angle gear head typoperating on 115, 220, or 440 volts.

#### Bradford "Metal Master" Electrica Tools

Along with its production of Bradfor "Metal Master" Lathes, The Bradfor Machine Tool Co., Evans at 8th St., Cin cinnati 4, Ohio, is now manufacturin a complete line of "Metal Master" elec trical tools, including lathe grinders, au tomotive equipment, disc sanders, adjust



Bradford "Metal Master" Grinder

able speed snagging grinders, adjustable

speed polishers, and nut runners.

The Bradford Metal Master Grinder illustrated herewith features an extra heavy duty motor; oversize ball bearings; semi-steel guards to meet American Standard and Safety Code; push-button station with starter having overload protection and under-voltage release; water pot; tool tray; and spark breakers.

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# NOW you can prolong blade life with proper tension

Properly regulated tension promotes accurate cutting, minimizes breakage, provides shock-absorbing action, and prolongs the useful life of power hack saw blades.

With the new Millers Falls calculator, you can determine tension at a glance, as well as feed pitch, and strokes per minute for operating any given width of blade on different classes of materials to get the greatest number of cuts.

Another important Millers Falls

development is the Tensiometer. A small cylinder, it is the only device made which will apply and maintain the proper tension regardless of blade temperature, eye elongation, or blade stretch.

To get a free Calculator and more information about the Tensiometer, ask for the name of your nearest distributor. And for the finest performance, ask for Blu-Mol single or double-edge high speed molybdenum blades.

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May, 1946

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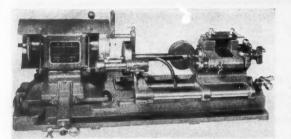
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MODERN MACHINE SHOP

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Blake Tap Grinder Equipped with Thin-Body Chuck

#### Blake Thin-Body Chuck

A thin-body universal chuck which depends on a single, pinion-operated threelobe cam to actuate the jaws has been placed on the market by the Edward Blake Co., 634 Commonwealth Ave., Newton Centre 59, Mass. Turning a pinion-by means of an Allen wrench-turns a cam which closes the jaws on the work. A spring acts on each jaw to hold it open when the cam is turned in the pressure-relieving direction.

The design principles of the chuck allow for the development of great jaw pressures on the work, making the grip positive. The chuck is hardened and ground throughout, ensuring accuracy and long life. As used on the Blake tap grinder, the chuck can hold taps having diameters from 16 to 16 inch inclusive.

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The Blake Thin-Body Chuck was especially developed for the bent shank tapper tap attachment used on the Blake tap grinder. As used with the attachment, the thin-body chuck serves two purposes; namely, (1) it allows for the insertion, shank end first, of bent and hook shank taps, and (2) it permits gripping the shank very close to the threads where the concentricity of the shank with the threads is greatest.

The cam-chuck principle can be applied to many other types of chucks, both general-purpose and special. It can be utilized with two, three, or four jaws, which may be formed to accommodate odd-



# Precision Fluting of Small Taps

Fully Automatic — No Skilled **Labor Necessary** 

Adaptable for a wide range of pre-

cision fluting and gunning of taps,

reamers, angular cutters, milling cutters. Sharpens circular metal cuting saws in gangs. An inexpensive automatic precision tool grinder for producing accurately fluted taps and reamers. Write for Bulletin 50F.

THE WARDU MANUFACTURING CO. 3166 Fulton Road, Cleveland 9, Ohio

340 MODERN MACHINE SHOP May, 1944 May, 1

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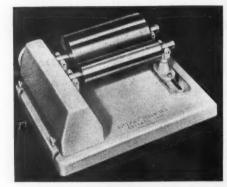
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Work to be lapped is placed between two revolving precision ground rollers of different sizes which have been charged with abrasive. The work is pressed against them with a notched fibre stick. Friction of the rollers causes work to revolve and the difference in the surface speed of the rollers causes a lapping or polishing action on the plug.

Actual shop use shows that the roller lapping method drastically reduces the number of necessary operations, as compared with the old "ring lap" method . . . produces superior results and saves time, labor and spoiled material.

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Chicago 41, Illi	inois

Send free bulletin with complete information on the New Spitfire Roller Lapping Machine.

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shaped pieces. The thin-body design makes it particularly advantageous for applications where overhang must be eliminated or the work area is limited. Another advantage is the lightweight which reduces the flywheel effect, thus permitting quick starting and stopping of the spindle on which such a chuck is mounted.

#### "Switch-O-Matic" Reversing Switch Control

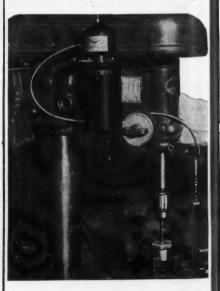
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Adaptable to machinery in all industries where automatic motor reversing is required the "Swich-O-Matic" Reversing Switch Control developed by the Read Machine & Tool Co., 4714 Huntington



"Swich-O-Matic" Reversing Switch Control in Use

Drive, Los Angeles 32, Calif., is intended primarily for drill presses, engine and turret lathes.

Claimed to increase machine production by permitting the threading of nonferrous metals at unusually high speeds, to reduce operator fatigue in machine threading, and to minimize tap breakage, the Swich-O-Matic includes a drum type switch, factory assembled and tested as a complete control unit which is

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## Robertson's ECONOMY Power Hack Saws

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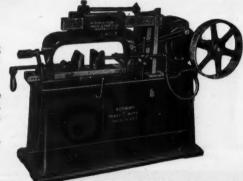
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**Few Adjustments** Hydraulic Lift on Back Stroke

The machine illustrated is the ROBERTSON ECONOMY No. 3-B. Capacity: 6" x 6" with 6" stroke. Takes 10", 12", 14" blades.

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Vast throngs of new shop workers, trained in war industries, have been using "Yankee" Fine Mechanics' Tools for the first time . . . mastering fresh trade skills which will stand them in good stead in the vital production period ahead. They have learned what skilled mechanics and old-time factory men have long known . . . that "Yankee" Tools complete innumerable tasks faster, easier, and better. For half a century, the ingenuity of "Yankee" Tools has set a high record in speed and accuracy.

Order from your industrial supply distributor, or write North Bros. Mfg. Co., Dept. MMS-546, Phila., Pa.

"YANKEE" SPIRAL SCREW DRIVER No. 130A A Size for Every Purpose

## "YANKEE" TOOLS

make good mechanics better North Bros. Mfg. Co., Phila. 33, U. S. A. Established 1880 easy to install. It can be operated either automatically or manually on intermittent operations without changes in machine setup, or the machine may be stopped manually at any position of tool travel and restarted without altering the accuracy of operation.

#### Super-Treat "Flash Freeze" Unit

Super-Treat Inc., Dept. F., 3412 Beekman St., Cincinnati 23, Ohio, announces a unit which is recommended for all rec-



Super-Treat "Flash Freeze" Unit

ognized cold-treating operations, including shrink fits, gage stabilization, and treating tools such as power saw blades milling cutters, drills, reamers, dies and so on. Known as the "Flash Freeze" the unit, it is claimed, can be cooled from room temperature to minus 130 deg. F. in approximately two hours and this extremely low temperature readily maintained.

The Super-Treat Flash Freeze Unit is described as simply and ruggedly constructed and foolproof. To use, dry ice is merely added to the heat transfer medium, the lid of the unit swung into position, and the starter button pressed. The unit can be furnished with either standard or special work baskets.

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Adaptable to Milling of parts of various shapes and sizes . . .

SLOTS 2 SIZES AT ONCE, TWO CON-TINUOUSLY OPERATING CONVEYORS. AUTOMATIC BURR REMOVAL...AS HIGH AS 3000 SLOTTED PARTS PER HOUR.



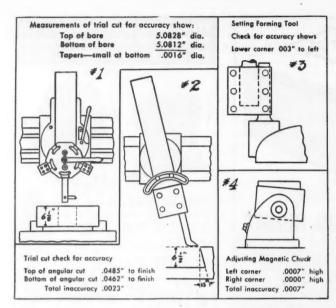
## PELLOW MACHINE Co.

13510 FOLEY AVE., DETROIT 27, MICH.

May, 1946

MODERN MACHINE SHOP

345



Illustrations taken from some of the examples presented in Spence's Formula

written a 24-page book in which he explains the principles and application of his formula.

Beginning with a chapter on the Purpose, Principle and Practice of the formula. in which he explains terminology the and gives general instructions for procedure, he explains the application of the formula to the setting of tools on each of the major types of machine tool operations. As a matter of fact, the use of the formula re-

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quires a knowledge of nothing more, mathematically, than simple arithmetic.

The second chapter covers the subjects of Straight Turning and Boring; the third chapter deals with Tapered Turning and Boring, and so on, the text giving detailed instructions for setting the cutting tool so that angles and tapers can be cut without the necessity of taking repeated cuts and measuring and resetting the tool between cuts in order to obtain the necessary accuracy.

The fourth chapter deals with Tapered Facing, the fifth discusses Grinding Operations, and the succeeding chapters explain the use of the formula in Planing and Shaping, Drilling and Specials,

#### Spence's Formula for Quick and **Accurate Setting of Machine** Tools

The glow of satisfaction that comes to an expert tool or diemaker when he successfully concludes a difficult set of calculations in "trig" must have been multiplied for Robert T. Spence when he realized that he had developed a formula for tool-setting which, if it could be placed in enough hands, would save unlimited hours for the metal-manufacturing industries. To achieve that end Mr. Spence is making his formula available to those who can appreciate its value, and has



EGRIND THEM Used on tool and cutter grind-ers — surface grinders — even bench lathes. Taps sharpened after center is destroyed. No collets. Complete. No extras. Writel BROACH

KEYSEATER The Reading Bench Machine does not require bushings or guides. Very

% cutter. Low first cost. EADING MACHINE COMPANY READING (CINCINNATI), OHIO



May, 1

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## BROACHES

Converted, Reconditioned, Sharpened. Prompt service on sharpening.

> Manufacturers Broaches

Most Standard Keyway Broaches Carried In Stock.

Reconditioning, salvaging and converting high speed and carbide tipped metal cutting tools.

#### CONANT TOOL & ENGINEERING CO.

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#### How Capewell Hack Saw Blades Step Up Sawina Efficiency

In a hack saw blade your effi-ciency is controlled by the pre-cision with which the blade is manufactured. Take teeth, for instance. You can't afford to have your Receiving Department put a micrometer on each blade to check the set. But you can depend on the painsteking inspection system at Capewell — developed during 65 years pre-eminence in the metal-working industry. This is just one of the features of Capewell's precision manufacturing. Let our distributors tell you about the others. We depend on distributors to give you service Order from your distributor a trial lot of Capewell blades that you may see for yourself how they will improve efficiency on your own tough jobs. stance. You can't afford to have

THE CAPEWELL MFG. CO. HARTFORD, 2, CONN.

Forming Tools, Cams, Jigs, Fixtures, and so on, concluding with Hand Operations.

In each chapter the text presents stepby-step instructions for procedure, with from one to three examples, including drawings, to simplify the task for the mechanic. Written by a man who has spent the greater part of a lifetime as an expert tool and diemaker, the instructions are presented in clear, understand-

able shop language.

The book is not for sale, however, un-less the right to the use of the formula is purchased with it; with the formula any number of books can be purchased for use in one plant. The price for the formula is \$50, with extra copies of the book available at 50 cents each. It is Mr. Spence's theory that in any shop or toolroom where fine or complicated machine work is the order of the day the formula will quickly pay for itself in savings in time and manpower.

To any concern that is sincerely interested in the possibilities of the formula Mr. Spence will submit a copy of the formula for 15 days examination and trial, or longer, if circumstances war-rant. It is expected that during that period the procedure outlined in the book will be studied and applied, and if found

as represented, accepted. If for any reason it is rejected, the book can be returned. The book is, of course, copyrighted.

The formula is being made available through Spence Products. Lynn. Massachusetts, and will be submitted to a responsible officer of any reliable firm upon application.

#### Walton Pipe Tap Extractors

Designed especially for the accurate quick, and easy removal of broken pipe threading taps, a group of ten pipe tap extractors has been added as stock sizes



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Walton Pipe Tap Extractor

Partan\_ METAL CUTTING SAWS

#### HACK SAWS --BAND SAWS

The SPARTAN Line of Hack Saws and Band Saws offer the right blade for every job, blades that today are out in front in hundreds of plants. Furnished in High Speed, Kutall Molybdenum High Speed, Flexard, All Hard and Flexible styles and Contour Cutting, Flexible back and Spring Temper Metal also Wood Cutting Band Saws. Stocked by Distributors in your territory.

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348

Do you want accurate work from your machines? . . . then use

#### LEVELING JACKS



Under the next heavy machines or any equipment you will install or rearrange.

Leveling jacks are indispensable and a real help to your reconversion problems making re-arrangements easy and fast.

We make them in three sizes which cover the entire range of requirements.

Write for descriptive literature and prices.

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"OUTWEARS THE BEST BRONZE METAL"





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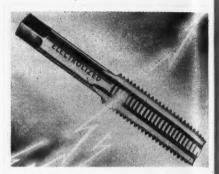
by The Walton Co., 94 Allyn St., Hartford 3, Connecticut.

Constructed on the same principle as Walton extractors for hand and machine screw taps, the pipe tap extractors are available in both 4 and 5-flute styles for all sizes of pipe taps from 1/8 to 1 inch inclusive.

#### **Electrolized Tap**

The Electrolized Tap Corp., 148 W. River St., Providence, R. I., is now offering a high speed tap treated by a process known as "electrolizing" that combines high voltage with a chemical bath and a rare metal to produce an exceedingly hard case on the cutting edges and the entire surface of the tap.

This surface is in the form of a thin deposit of an unusually hard alloy. The deposit or case Rockwells approximately 83 on the C scale without being brittle. The alloy is said to reduce chip and surface friction which, combined with the extreme hardness of the metal, results in a significant increase in the productive life of the tap. According to the manufacturer, the dimensional accuracy of the tap and of the thread it produces is not affected by the electrolizing process since



Electrolized Tap

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it adds only 0.00003 inch, evenly deposited over the entire tool.

The Electrolized Tap is available in the usual range of sizes in standard and spiral pointed hand and machine screw types.

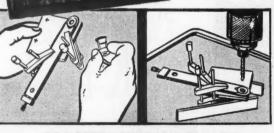
#### Burdick Universal Gage Handle

Designed to accommodate reversible type plug gages, both threaded and plain,



QUICK! ACCURATE! Machinists who use the Center-Locator claim that it is the simplest, speediest, most accurate method of locating centers and drilling holes on the market. It actually makes a drill press do the work of a jig boring machine!

igs, piercing dies, molds, templates, metal patterns and machine parts demand an accurate relationship between a series of holes—as well as close tolerances between the centers of these holes and other points. The Center-Locator, with its powerful magnifier, performs this function quickly and accurately. How it operates: Lay out work with height gauge, locate center through the magnifier—then replace magnifier with any of 18 drill bushings furnished. Askyour mill supply house, or \$34.00 postpaid.



#### MASTER SPECIALTY CO.

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350

Minneapolis 6, Minn.

Literature on Request

### ROGERS

## PATENT ADJUSTABLE HOLLOW MILLING TOOL

Quickly and easily adjusted — rugged in construction—rigidly locked when on the job.

Carbide tipped blades optional, are quickly interchanged with the high speed steel blades, for cutting the harder or gritty materials.

These adjustable hollow milling tools are designed and built to the ROGERS quality standard since 1890.

Write for catalog

## THE JOHN M. ROGERS TOOL CORP.

Gloucester City

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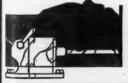
**New Jersey** 



# MEAD Presents The

COLUMN PRESS
The new Mead Column Press delivers a ram pressure of 3000 lbs. on 110 lb. lbs. on 110 lb. lbs. or

bs. on 110 lb. line air pressure and is especially useful for small to medium runs where it is desirable to leave fixtures permanently mounted to base. Successive operations are quickly performed in this manner; swing ram over desired fixture, raise or lower to correct height by the raising screw, lock in place with the two drawbolts. In general, it is desirable that fixtures be "self-sufficient," requiring only the pressure of the plain ram to complete the operation. This eliminates need for attaching dies, punches, etc., to ram for each new operation. Completely described in the new Mead AIR POWER Catalog of Air Clamps, Air Vises, Air Presses, Work Feeders, Valves, Controls, etc. Send for copy.



M E A D SPECIALTIES COMPANY

4114 NORTH KNOX AVENUE, DEPT. AA-56, CHICAGO 41, ILLINOIS

May. 1946

MODERN MACHINE SHOP

351

a universal gage handle of the type illustrated herewith is now being marketed by The S. J. Burdick Co., 230 W. Huron St., Chicago 10, Ill. Available in six sizes for accommodating all diameters of gages from 0.020 to 0.510 inch, the handle is constructed with an unusually flexible wide range collet which, by means of a nut, is brought to grip the gaging member by a front and back taper on the nose of the collet. With this arrangement, approximately 30 per cent of the total length of the collet is in parallel contact with the gaging member, thus eliminating slippage of the

member, it is claimed. In addition, the collet is said not to mar or scratch the gaging member.

Made entirely of aluminum with the



Burdick Universal Gage Handle

exception of the collet, which is a very high grade of spring steel, the Burdick Universal Gage Handle is supplied with an anodized green cap for the "go" end and a red cap for the "no-go" end.

#### Jarvis Lubro-Brush

Known as the Jarvis Lubro-Brush, a simple device which is designed to automatically lubricate and brush taps, reamers, drills, countersinks, and other tools, thereby keeping them clean and free cutting, is announced by The Charles L. Jarvis Co., Middletown, Conn. The device can be readily installed on all standard drill presses and is also said to readily adapt itself to other machines such as punch presses, small lathes, hand millers, and so on.

The principal operating feature of the Jarvis Lubro-Brush is simple cam action which transmits a short lift stroke into a sweeping action of the brush. The arrangement of the device is such that while the cutting tool is engaged and cutting the Lubro-Brush is in a rest position, receiving a few drops of oil. On the upstroke of the cutting tool, the Lubro-Brush sweeps the tool clean and lubricates it for the next cutting operation.

The complete assembly of the Jarvis Lubro-Brush comprises a set screw, quill clamp, outer sleeve, socket head cap

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#### HEADBAND MAGNIFIER 21/4×

Use of both eyes reveals true depth of details. Magnifica-

tion of 2½x. Free working distance, about 8", permitting unhindered use of hands. By just lifting your head, your eyes are free for any other activity. Eyeglasses may be worn while using. Highest optical quality. Eyeshade of Tenite—practically unbreakable.

Also APLANATIC FOLDING POCKET MAGNIFIERS — 6 and 9 power



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Dept. H-51-5, 485 5th Ave., New York 17, N. Y.

Improve quality of work. Save many hours in machine setting. Cut production time. Develop confidence in your mechanics. Stop all guess work. Get precision required. "Spence's formula for quick and accurate setting of machine tools" applied to your shop practice produces all these results. Easily readable and understandable. For details write immediately to SPENCE PRODUCTS, LYNN, MASSACHUSETTS.

#### PERSONAL APPEAL



ROBERT T.

352

How do you do, gentlemen? As I cannot visit every machine shop in America, I take this means of greeting you. I want to help thousands of mechanics to learn easy and sure ways of mastering their shop problems, thereby help you to improve your products and cut costs. I have definite plans of rendering service to the industry on big scale which depend largely upon cooperation from all of you. Now that I have greeted you, it will be beneficial for you That form to write in and get acquainted. Sincerely yours,

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MILL IT ON YOUR LATHE

NOW-you can do milling, slotting, grinding, grooving, squaring shafts, sawing at angles, and many other important operations on your lathe. PALM-GREN MILLING ATTACHMENT is a necessary fixture for small shops, schools and emergency work in large plants. Fits South Bend, Atlas, Craitsman, Logan, Sheldon and all other makes. It has 360°

graduation for rotary angle adjustments, also graduated feed and adjustment screw. Easily mounted by straddling lathe's regular tool post. Try one—it will quickly pay for itself.

IMMEDIATE DELIVERY Depth Jaws Weight Base F.O.B. Open 15/8" 21/2" 4" Factory \$18.75 Pounds Opening 11/2" 21/2" 61/2 11/4" 25 39.75

250 2½" 1½" 400 4" 1½" Order from your dealer or jobber. Write for circular No. 350.

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TUBE SLOTTING, TUBE SHAPING AND CUTTING FLAT SHEETS BY TEMPLATE OR TO A SCRIBED LINE

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FOR guards—gauges—flanges—flights—panels— experimental work—models and special devices— epair and replacement parts.

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Flat mild sheets ¾" Tough alloys %" Tubing:

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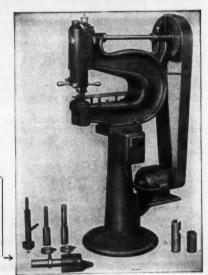
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No. 218

**Tube** cutting

Attachment

Planeer Manufacturers of Nibbling Machines



May, 1946

MODERN MACHINE SHOP



#### **Get Greater Accuracy** ... At Reduced Cost with the LORD & DAVIS

## Supersensitive

#### **Precision Drill Press**

YOU reduce costs and make more money ... you get accurate drilling of small diameter holes, too . . . when you work with the Lord & Davis Supersensitive High Speed Precision Drill Press.

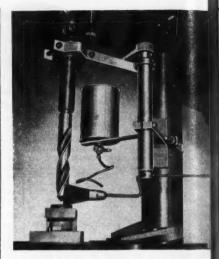
This efficient, money-saving machine makes it easy to drill small holes accurately because it is designed for supersensitive operation. A floating spindle enables the drill to be fed with an ounce of pressure on the sensitive operating lever. Consequently, the cutting action of the drill is known to the operator and pressure can be regulated to feed the drill as required. This precision drill press reduces spoilage, eliminates drill breakage, cuts down operator fatigue and assures lower production costs.

If your production work demands accurate drilling of small diameter holes (18" down to .004"), investigate the Lord & Davis Drill Press promptly.

> Sole Dist. for U.S.A. and Export Z. W. BROUILLARD & CO. Springfield 9, Mass. Export Office: Room 2111 and 2112,

401 Broadway, New York, N. Y. **Dealers: Choice Territories Open** 

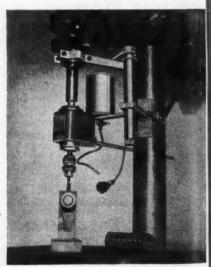
Massasoit Machine Co. 222 GROVE ST. WALTHAM 54, MASS.



Jarvis Lubro-Brush automatically lubricating and cleaning a large drill

screw, quill clamp screw and nut, bracket assembly, outer sleeve clamping screw, cam tube, cam tube finger, cam

Jarvis Lubro-Brush in rest position to receive few drops of oil while tap is engaged and cutting



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#### DRILL and PILOT BUSHINGS Frictionless -Rotary

For core drilling, T. C. and high speed boring, turret tool, piloting, etc. Won't stick or clog. Dust proof as a watch. Write for details.

GIERN & ANHOLTT TOOL CO. Detroit, Mich. 1312 Mt. Elliott Ave.

Gar Jast. Accurate Metal-Cuttina CARBIDE TOOLS, BLANKS, and MILLING CUTTERS (BNNAMETAL Sna. LATRORE DA.

#### NEW PYRALIN TIPPED MALLETS



Solid, "non-sparkling, non-magnetic alloy head," threaded at both ends.

Threaded plastic tips can be screwed in by hand. Oval hole drilled in hammer head prevents handle from coming off or turning.

When buying mallets be sure to buy SOUTHWEST and get the original.

Send \$1.00 and name of your nearest dealer, for prepaid sample mallet.

#### SOUTHWEST MFG. CO.

Dept. M, P. O. Box 776, E. First St. Tel. 5295, Santa Ana, Calif.

## BOYAR-SCHULTZ

## Knurling Tool

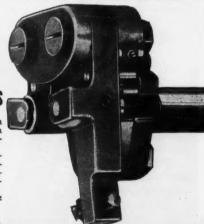
#### FOR TURRET TYPE SCREW MACHINES

New Screw Machine Tool of outstanding design and construction making it possible to perform many of the knurling jobs formerly considered im-possible with tools of other types.

Built on a new principle, operated from the tur-tet, with feed and pressure equally applied simul-aneously to both sides of work. Speedy in opera-tion, giving clean, accurate knurling in a mini-mum of time.

Sturdily built with the usual Boyar-Schultz quality of precision manufacture.

Be Sure to Write for New Detailed Circular



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MODERN MACHINE SHOP

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#### YOU GET:

- Faster Sawing
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Makers of hand and power hack saw blades, frames, and metal cutting band saw blades

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tube cap, spring, spindle, spindle screw, brush, brush spindle bearing, quill clamp lever, key screw, clamp band assembly, oil pipe, can, oil valve, pipe lock nut, can bocket, and brush lock.

#### "Universal" Face Kennamill

The accompanying illustration, which shows the "Universal" Face Kennamill, should have been included with the description of this tool which appeared on page 326 of the March issue of MODERN MACHINE SHOP. Developed by Kennametal Inc., Latrobe, Pa., this milling cutter consists of a precision built heat-



"Universal" Face Kennamili

treated steel body, or toolholder, with a set of detachable solid Kennametal blades (as many as there are inches in the cutter diameter) mechanically held in position. The cutter is available in five standard diameters of 4, 6, 8, 10, and 12 inches. Blades for these are of the same cross section, and, when shortened by regrinding, can be used in smaller cutters successively. They are "formed" at both ends and can be used in either right or left-hand cutters.

The Universal Face Kennamill can be adapted for milling different materials simply by interchanging blades. Those having the proper grade of carbide and suitable cutting angles are selected and inserted.

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DANLY KWIK-KLAMP **TOGGLE CLAMPS** 

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Quick, Positive Clamping in any position.

For complete data, including tested pressure figures, send for the new Kwik-Klamp Catalog.

DANLY MACHINE SPECIALTIES, INC. 2100 South 52nd Ave., Chicago 50, Illinois

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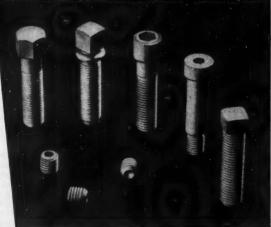
SPEED UP production in multiple operations with push-out type Hall Collet Chuck. Full spindle capacity or over. Tremendous grip over or under stock size to .007 - without adjustments... no bearings, friction, heat or loss of power. Instant release without stopping lathe.

Two-inch capacity, now only \$145 One-inch capacity, \$95
Round, square or hex collets, plain-serrated

HALL MANUFACTURING COMPANY 622 Tularosa Drive . Los Angeles 26, Calif.

## SPECIFY Mac-its FOR STRENGTH. APPEARANCE, ECONOMY

Mac-its offer a complete line of heat-treated, alloy steel screws for the toughest kind of holding-down jobs. They're accurately made with die-cut threads, and heat-treated for the type of service in which they will be used. Sold through recognized distributors from coast to coast, and in Canada.



STRONG, CARLISLE & HAMMOND COMPANY CLEVELAND 13, OHIO

MANUFACTURED BY

MAC-IT PARTS COMPANY LANCASTER, PA.



Quickly applied with brush or cloth. Dries instantly, ready for scribing.
 Adheres perfectly to any clean, dry surface; no special preparation required.
 Not affected by oil, water, coolants, etc.—yet readily removed with Pen-Blu Remover.
 Will not blur, smudge, chip or peel.
 Lines remain sharp and highly visible throughout all normal shop handling.
 Low in cost, economical to use.



#### Motor Tool Steep Spiral Milling Cutter

A milling cutter of the steep spiral ground form type is now being offered in either arbor or shank style construction by the Motor Tool Manufacturing Co., 7777 Cortland Ave., Detroit 4, Mich. Available in a wide variety of designs which are said to cover approximately 80 per cent of all form cutter applications, the steep spiral milling cutter is said to cut with a continuous shearing action, the teeth being in contact with the work at all times. Of particular importance is the fact that the extreme helix angle can be carried up to 30 degrees right or left hand. On long form cutters, staggered notches are incorporated in the design to serve as chip breakers.

mo clu

A simple and unique fixture for sharpening the Motor Tool Steep Spiral Milling Cutter and for keeping it form constant has been developed by the company. Adaptable to any No. 2 Cincinnati cutter grinder and soon to be available equipped with suitable brackets that enable it to be applied to all makes of cutter grinders of recent manufacture, the fixture is designed with a hardened and accurately ground cylindrical duplicating template roll which is said to transfer the exact form of this roll to the cutting edge of the tool itself. Any operator in a cutter sharpening department can, it is claimed, quickly resharpen steel spiral milling cutters using the fixture.

#### L. A. B. Dynamometer

A dynamometer for quickly measuring the torque and horsepower of all types of fractional horsepower motors, including fleepower, is now being offered by the L. A. B. Corp., Summit, N. J. The dynamometer is of the eddy current type with d.c. excitation. Torque loads are varied by rheostat adjustment.

Self-damping and self-cooling, the L. A. B. Dynamometer is designed for uninterrupted and continuous service and permits one-man operation. Mounted on an ample base, the unit is adapted for speedy production setups and is suitable for testing electric, hydraulic, pneumatic, or internal combustion motors and flexible shaft transmissions.

Either running or stalled torques can be easily measured by means of the L. A. B. Dynamometer, which is available in small sizes for accurately measuring torques at speeds up to 15,000 r.p.m. and

### "FORM - MASTER" THE

### ANGLE and RADIUS DRESSER

A sturdy, quality instrument designed by form-grinding specialists to dress both angles and radius at low cost. Two 1/2 ct. diamonds and instrument case included-\$150.00 complete.

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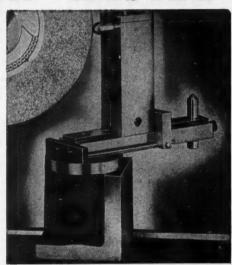
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- Chatterless and dustproof
- .0001" accuracy obtainable
- Simple to operate
- Reasonably priced

Call your supplier or write

J. & S. TOOL CO.

477 Main St., E. Orange 5, N. J.





у, 1946 May, 1946 MODERN MACHINE SHOP

up to 10 ounce-inches. Size for measuring up to 25 inch-pounds can also be supplied. Additional capacity is obtainable with external cooling and for short

### "Visco 77" Emulsion Breaker

Honan-Crane Corporation, 682 Wabash Ave., Lebanon, Ind., has made arrangements for the exclusive sale and distribution of Visco 77, a lubricating oil-water emulsion breaker.

### ADVANCE CLAMPS

Cut Set-Up Time 75% on

JIGBORERS THE ONLY T-SLOT CLAMP

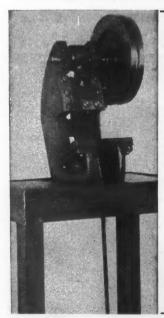
For use on all machines with T-slots. Manufactured and sold by

ADVANCE MACHINE WORKS FORT WAYNE 7, INDIANA

Visco 77 is a liquid chemical additive which, when added to the most stubborn water emulsions in the amount of 1/10 of one per cent (one gallon of Visco 77 to 1,000 gallons of lubricating oil) and the oil maintained AT REST at a temperature of from 180 deg.-185 deg. F., will break the emulsion and all water will settle out in from twenty-four to fortyeight hours.

Visco 77 has been in use for several years by some of the major industries on viscous circulating system oils, as well as heavy EP oils, and is equally satisfactory on both types of oils, or on any oil regardless of viscosity.

Visco 77 is non-corrosive and harmless to any lubricating oil, and can be used with safety on any major circulating system where difficulty is experienced in removing water from the lubricating oil, such as steel mills, metal working industries, aluminum plants, gear systems, Diesel engine crank case oils, engine oils, etc. Visco 77 is a tried and proven product, and provides industry with the most economical means known for breaking emulsions or insuring the removal of water from oil after it has formed an emulsion. It is available in 55-gallon nonreturnable steel drums and 5-gallon cans.



### INCLINEABLE **POWER PRESS**

HIGH SPEED - RUGGED

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### GRAY TURRET HEAD METAL **CUTTER OR NIBBLER**

GRAY, Originator of First Practical Metal Cutter or Nibbler

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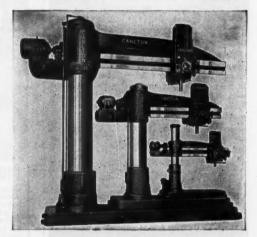
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May, 1946

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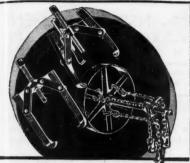
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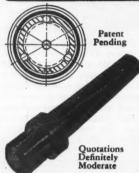
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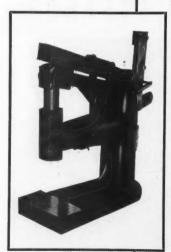
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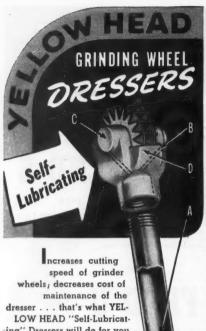


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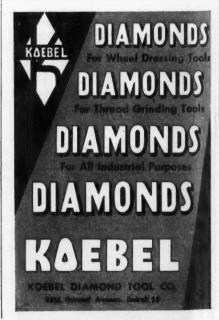
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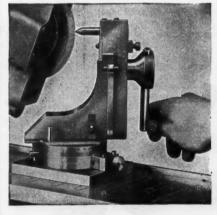
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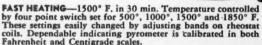
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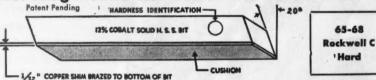
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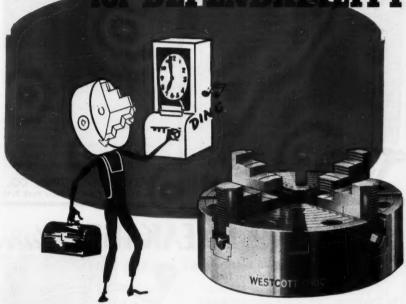
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Westcott Chuck C 736 E. Walnut St. Oneida, N.Y.



PRECISION · DEPENDABILITY · SERVICE

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MODERN MACHINE SHOP

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requires no special training . . . completely equipped. Weld heavy steel or light gauge me-tals. Mounted on heavy steel base, cast aluminum wheels. Sturdy as the Rockies, reliable, proved in actual operation . . . FORNEYS are used thru-

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# AP BREAKAGE Reduced

Square, Straight Tapping In Half the Time

The Dahlstrom Tap Guide practically eliminates tap breakage and saves wasted hours getting broken taps out of expensive dies. It does the job in a jiffy with work always straight and true. Just fasten it to a post or bench, slip a Tap Adaptor into the spindle, and even an inexperienced operator can handle it. Equipped with 7 Adaptors, ranging from 8-32 to ½". Taps not furnished. Ask your mill supply house, or \$42.50 F. O. B. Minneapolis.

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Dahlstrom Manufacturing Co.

418 South Sixth St., Minneapolis 15, Minn.



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# Reduce Costs! Avoid Injuries! Increase Production!

WELDISKS grind better because they lie flat...do not soften up ...do not curl or warp.

WELDISKS last longer, thereby reducing costs, because, unlike ordinary disks, their amazing cold-setting cement (a scientific formula – not glue or resin) actually improves with age!

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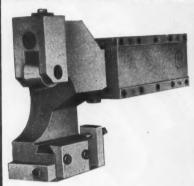
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# C. &T.-

# SHAVE TOOL HOLDER



# for Acme-Gridley New Britain Gridley and Cone Automatics

Speed production in your Screw Machine Department with this proved money maker—

### ADVANTAGES:

- Produces work within ± .0005" Eliminates inaccuracies of machine and stock
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- Of steel construction throughout—wearing surfaces hardened and ground
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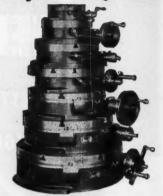
Equip your screw machines with C & T Shave Tool Holders and increase production

Write for circular and prices. State make and model of automatics.

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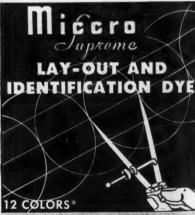
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Sizes 9", 12", 15", 18", 21", 25"
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May, 1946

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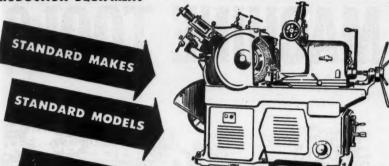
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VETERANS OF WORLD WAR

To help you in purchasing surplus property, vaterans' insite have been established in each Wor Assets Administration Regional Office.

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MAKE	MODEL	SIZE	
Distrace) S	************	42005U433	Denterless grinder
manali	-	ENTHORNA	Beach grinders
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OFFICES LISTED SELOW ARE TEMPORARILY IN RECONSTRUCTION FINANCE CORPORATION AGENCIES

Offices located at: Allouts - Birminghom Dated: Notice - Chiefold - Chiefold - Chiefold - Dated: - Dat

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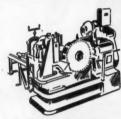
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GOVERNMENT OWNED SURPLUS

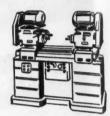
# **MACHINE TOOLS**



AUTOMATIC SED TIPE MELING MACHINE Models 1-12 and 1-18, located in New York, Detroit, Cleveland, Chicago, and Boston Regional Offices.



COLD SAWING MACHINES, CIRCULAR 1½° to 21° capacity, in standard models of well known makes, located in Detroit, Chicago, Cleveland, Philadelphia, Boston Regional Offices.

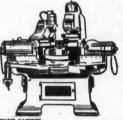


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PERCISON SORRIO MACHINES Both single and double end type located in Detroit, Chicago, Boston Cleveland, Minneapolis, Kansas City and, in lesser quantities, other Regional Offices.



VERTICAL & MORIZONTAL DRILLING MACHINE Special Kingsbury type machines located in Boston, Chicago, Detroit, Philadelphia, Richmond, St. Louis and, in limited quantities, other Regional Offices.



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May, 194

### PRODUCTION EQUIPMENT

# NOW!

### MODERN MACHINES... MANY MODELS... STANDARD MAKES

hee machine tools must go to work. You need the profits, lastice useds the production. Taxpayers used maximum recovery a the government of their original cost. On hand, at every War laste Administration office in the U. S. there are hundreds of itse machines. Nearly every category of modern production significant can be obtained at low cost. You have a unique opportuity to initiate new enterprises or modernize old . . . and at the set time do your country an important service. Check this partial is over carefully for equipment you can use. Then write, wire, or pose your nearest War Assets Administration office for detailed isomation, or if you prefer mail the coupon.

### CHECK LIST OF SPECIAL MACHINE TOOL BUYS!

live are a few of the many thousands of machine tools available through he Assets Administration.

BACHINE (Punction)	TYPE	SIZE OR CAPACITY	Greatity Available New
leing, Orilling & Hilling	Nortzental	Under 3° to 4°	309
hing & Turning Drille	Vertical	Under36"to 130"Suring	600
Iring Flood Roll Took	Vertical		87
Parision Boring Harbinos	Hartsontal bridge— single and Hartsontal bridge— deable and	Under 8" to 14" Under 8" to 14"	498 228
•	Bax column— single spindle	Under 1/5" Cop. Up to 22" Soring 1/5" to 1" Cop. 15" to 24" Soring	267
	Restil column— single spindle	Sender 1½° Cop. Up to 32° Sering 1½° to 1° Cop. 14° to 34° Swing	798
	Spilither Floor & Wellestel Son column	Under 15° Cop. 13° to 23° Swing 15° to 1° Cop. 16° to Over 36° Swing 1° Cop. and over 24° Swine and over	933 1878 434
	Smallive Plear & Ped- estel Round column	Under 1/4" Cap. 12" to 22" Swing 1/4" to 1" Cap. Under 16" to 24" Swing	894 1131

TYPE	SIZE OR CAPACITY	Ownishy Available Hear
Sensitive Plear & Pedestel Upright Type —Box column Sensitive Plear & Redestel Herick Type	Up to 28" Swing	549
Manufacturing	Up to 28" Swing	161
Type Sacr Klassburg Was	Up to 33° Swing	294
& Vertical		250
Verticel—Universal	Under 14" Diameter	321 89
Subsect & Internal		380 183 278
Spor & Hollosi-	up to 25" Draw,	189
Bavel Type not led.	the to \$40 files	377
Generating Type	4	140 190
External only		80
		87
Retary Type		133
Plain External Cullaries	Up to 30° Swing	1730
Universal	Up to 16" Soring	347
Creek Ple	All sissa	907 223 83 348
Internal Cylinder— Machanical Food	All sisses	220
Hydraulic Food Internal Cylinder— Internal Cylinder—	Up to 42° Swing Under 12° Swing	1994
Ayle, Siz. Comb. Hole & Face Internal Cylinder—	· 16* Swing and over	127
Туре	Under 16" Dism.	39
Auto. Stz. Conteriosa	Up to 28" Dism.	146
Retury Table	All size table dism.	274
gla Spdl. Rotary Tobia *	12" to 48" Table Dium.	187
Nortz. Spindle-	12º longik work cap. and ever	144
	Under 18" to 120"	840
	All class	498
Internal	8° Cap. and over	82
Tool & Collers— Universal	All dos	491 348 483
Single Point Tool	All sizes	
Send-Single End	All sizes lip to \$" Wheel idlate,	3874 1105
Plear—Double find —Dry Plear Comb. —Wet & Dry	Up to 24" Wheel diem. 10" to 14" Wheel diem.	883 216
-Swing Frame		198
	Sensitivo Picer & Pedicard Uprigid Type — Sensitivo Picer & Pedicard Uprigid Type — Sensitivo Uprigid Uprig	Searchive Plear & Fundance Upright Type —She relation Problemed Upright Type —Both relation Problemed Upright Type —Record column Problemed Upright Type —Record column Bloovy Manufacturing Space, Kingsphary Way & Vestical Problemed Upright Type & Vestical Problemed Upright Type & Vestical Bestered & Internal Space A Internal Space A Internal Space A Internal Space A Internal Space & Hollington Bestered & Internal Space & Hollington Statemed & Internal Space & Hollington Statemed A Internal Space & Hollington Statemed Type External & Internal Company Statemed Cylinder— Globerous Auto, Sta. Famelium Company Statemed Cylinder— Globerous Auto, Sta. Famelium Lineared Cylinder— Market Statemed A Internal Line

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Use this coupoin to conserve your time, Print in a brief description of the make, type, model, and size of machine in which you are interested. We will determine in advance our stock sitfation on the machines and inform you quidly. No obligation, of course.

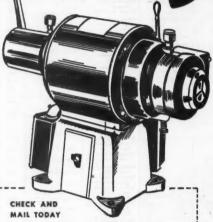
To War Assets Administration: Do you have in surplus stocks the following machine tools? Where are they located? What is their condition?

lype	Make		, Model	 -Dile	•
******		*******	•	 	•

Name	
Titte	
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Address	
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8128 MAKE MODEL Speed Lathes Multi-cut Lathes | .....

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WHERE SPEED LATHES AREI

W.A.A. Regional Office	1/2 HP-	Va to 1 HP	1 to 3 HP	319+
Detroit	204	271	147	23
Chicago	97	1.5	87	-
Clemeland	8.7	32	10	*****
New York			3	******
Denver	11	60		*****
St. Louis	166	*****	26	******
Minneapolls	67	16		*****
Spokene	3	11		*****

SMALL PIECE MULTI-CUT PRODUCTION LATHES



OFFICES LISTED BELOW ARE TEMPORARILY IN RECONSTRUCTION FINANCE CORPORATION AGENCIES

Offices located et: Atlente - Breninghem - Besten - Chestelle , Chicago - Cloveland - Dol Darioll - Helone - Heseton - Jacksonville - Kanses Chy, Ma. - Lifeli Bask - Lee Angeles Mannoagolis - Neuhville - Neuh Crisons - New Yark - Oklohomo Chy - Donnies -Pertland, Ore. - Richmond - St. Louis - Eatl Laba Chy - San Antonie - Sen Francisca - Sent Clinimati - Feet Wark (Calphanes 3-238)



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dreds of Lincoln Welders in the pop-300-400 Ampere are also available;



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pos Weldere located in hiladelphia, Detroit, hicago, Los Angeles, leveland and Kansas ity; Seam Welders in leveland, Chicago, etroit, Birmingham, oston and Phila-elphia. Also Flash





Save production time and money with port-able or stationary, sin-gle or multiple torch flame cutting machines. All types of gas cutting equipment available for quick sale.



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200, 300 AND 400 AMPERE RATINGS

Three million dollars worth of surplus Hobart Arc Welders must be sold Three million dollars worth of surplus Hobart Arc Welders must be sold between May 15th and June 15th. Most of this equipment is of the MG type but some quantity is available in gasoline driven units. Arrangements may be made to inspect the offered items. Largest inventories are located at Boston, Detroit, Cleveland, Chicago, Atlanta, Kansas City, Richmond and Philadelphia—but information on availability, condition and location may be obtained at any of the War Assets Administration Regional Offices listed below. The equipment will be sold on a "where is, as is" basis . . . used or unused . . . and priced accordingly. For full information contact the nearest office listed below or check and mail this coupon.

FREE SALE FACTS	To War Assets Administration: Please send me information prior to your sale on the evailability, condition and location of Hobart Arc Walders of the following
types:	. and ratings:
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t am also interested in:-	Per Linnage Product Miles Add A
LINCOLN ARC WELDERS	EPOT, SEAM, FLASH WELDERS
WESTINGHOUSE ARC WELDE	RS WELD POSITIONERS
(other) ARC WELL	DERS FLAME CUTTERS
Name	
Firm	
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City	State 176-2

All items subject to prior sale

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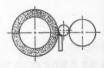
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### **Tool & Cutter Grinding**

RESHARPENING OF HIGH SPEED STEEL OR TUNGSTEN CARBIDE MILLING CUTTERS - REAMERS HOBS AND TAPS

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A Complete Resharpening Service for Flat or Circular Broaches up to 72" Length

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ALL SIZE BLANKS IN STOCK. Teeth Cut To Your Specifications. Prompt Delivery. Write for quotation.

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Whole assemblies or sub assemblies. Screw machine products up to 11/4". Mail prints for estimates.

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Axelson Heavy Duty Lathes. A general atalog covering the complete line of eavy duty lathes produced by the Axelon Manufacturing Co., P. O. Box 98, Vernon Station, Los Angeles 11, Calif., is low available from this firm. Included in the catalog are illustrated, descriptive. and tabular data on 14, 16, 18, 20, 25, and 2-inch heavy duty lathes with 24-speed selective geared heads, as well as detailed nformation concerning the various construction features comprising these machines. Copy free to mechanical execuives upon request.

Involute Splines, developed by the National Broach & Machine Co., 5600 St. lean Ave., Detroit 13, Mich., to meet the need for a practical range of side-bearng splines of involute form having root dearance on both the shaft and the hole, are the subject of a 12-page illustrated bulletin published by this firm. The buletin covers the advantages, construction features, and applications of these plines and illustrates and describes their production on "Red Ring" gear shaving and lapping equipment. In addition, the bulletin includes tables listing diametal pitch, diameters, and number of

teeth relative to the various involute splines available from National Broach. Copy of Bulletin No. SP45-11 free.

General No. 106 15-Ton Flexible-Power Press for fast, easy production straightening, assembling, staking, forcing, bending, burnishing, riveting, push broaching, pressing in gears, pressing in armature shafts, and so on, is the subject of Bulletin 381 published by the General Manufacturing Co., 6438 Farnsworth Ave., Detroit 11, Mich. This four-page illustrated bulletin includes data on the construction, operation, and specifica-tions of the press, and is available free.

"Hallowell" Key Kit for use in driving socket set and cap, Phillips and slotted head screws is illustrated and described in a four-page folder issued by the Standard Pressed Steel Co., Box 556, Jenkintown, Pa. A table included lists the sizes of the various keys and the sizes and types of screws which they will accommodate. A display of illustrations on the rear page shows various applications for the Hallowell Key Kit, Copy of the folder is available free by requesting Form 598.

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HIGH SPEED STEEL, STRAIGHT SHANK

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Extra Length



### 9" CUTTING FLUTES-12" LONG DRILLS

SIZE	LENGTH OVERALL INCHES	LENGTH FLUTES INCHES	PRICE EACH NET	SIZE	LENGTH OVERALL INCHES	LENGTH FLUTES INCHES	PRICE EACH NET
1/8"	12	9	\$ 1.50	21/64"	12	9	\$ 2.25
9/64"	12	9	1.50	11/32"	12	9	2.25
5/32"	12	9	1.50	23/64"	12	9	2.50
11/64"	12	9	1.50	3/8"	12	9	2.50
3/16"	12	9	1.50	25/64"	12	9	2.75
13/64"	12	9	1.60	13/32"	12	9	2.75
7/32"	12	9	1.60	27/64"	12	9	3.00
15/64"	12	9	1.75	7/16"	12	9	3.00
1/4"	12	9	1.75			•	
17/64"	12	9	1.85	29/64"	12	9	3.25
9/32"	12	9	1.85	15/32"	12	9	3.25
19/64"	12	9	2.00	31/64"	12	9	3.25
5/16"	12	9	2.00	1/2"	12	9	3.25

HIGH SPEED STEEL, TAPER SHANK

# TWIST DRILLS

Extra Length

SIZE	LENGTH OVERALL INCHES	LENGTH FLUTES INCHES	PRICE EACH NET	SIZE	LENGTH OVERALL INCHES	LENGTH FLUTES INCHES	PRICE EACH NET	
17/32"	15	12	\$ 6.50	27/32"	15	12	\$11.50	
9/16"	15	12	7.00	7/8"	15	12	12.00	
19/32"	15	12	7.50	29/32"	15	12	12.50	
5/8"	15	12	8.00	15/16"	15	12	13.00	
21/32"	15	12	8.00	31/32"	15	12	14.00	
11/16"	15	12	8.25	1"	20	15	16.00	
23/32"	15	12	8.50	1-1/16"	20	15	17.00	
3/4"	15	12	8.50	1-1/8"	20	15	18.00	
25/32"	15	12	9.50	1-3/16"	20	15	20.00	
13/16"	15	12	11.00	1-1/4"	20	15	22.00	

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VETERANS OF WORLD WAR II: To help you in purchaing surplus property from W. A. A. a vaterans' unit has been established in each of our Regional Offices.

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PARE	HITCH	

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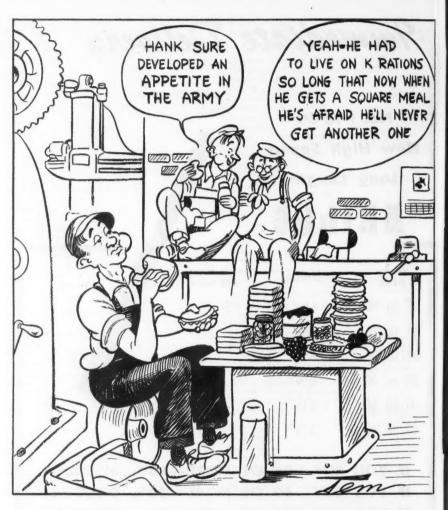
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#### Over the Editor's Desk

It is a matter of record that when the workmen were excavating the ancient buried cities of Pompeii and Herculaneum, a clay tablet was found upon which were inscribed the hieroglyphics that served as an alphabet in centuries long gone. When deciphered, the writing was found to be a letter in which the writer was deploring the passing of "the good old days" and predicting the coming of disaster. And so, undoubtedly, it has been through out the centuries; the world moves forward. Sometimes the path dips temporarily; sometimes the world muddles through a "slough of despond" for a period of time, but on the average the grade has slowly but steadily been upward.

The times when the world seemed to be headed toward perdition have always been periods of readjustment; unhappy periods for the people who lived in those times, and many times periods of grief that could have been avoided if those in power had not been so short-sighted and selfish. America has been through many of such periods—wars, panies, depressions and what not—and at the moment it looks as though another

bad mess is brewing for some time in the future.

As a matter of fact, America is facing the greatest opportunity for prosperity that it has ever seen. Even if the automobile industry works at top speed, it will be unable to catch up on the demand for cars before 1950. The market for homes is estimated at one million homes a year for the next ten years, and we have never even come close to building a million homes in a single year before. The same situation prevails as regards household appliances and accessories, machinery, transportation equipment,

and all other kinds of products.

Before the recent war the national income never reached the total of 100 billion dollars. At the beginning of this year, savings deposits in banks amounted to 30 billion dollars. Life insurance in force totaled 148 billions. National service insurance now has a face value of 125 billions. The War Bond total runs into many billions. The American farmer is in a better financial position today than he has ever been. If each individual American were willing to cooperate for the good of the nation, we could have many years of good times. Instead, we are creating a situation that is likely to end in more grief than this country has ever seen.

We all had hoped that, with the return of peace, prices would return to a normal level, everyone would go to work on peace-time projects, and peace, happiness and prosperity would be ours. However, labor had taken advantage of the emergency and the manpower shortage to force one wage increase after another, with the result that

the cost of living rose accordingly.

At the close of the war, prices and wages should have dropped to a normal level; perhaps not as low as before the war, but to a reasonable level. Instead, labor has demanded even higher wages than prevailed through the war years. Manufacturers cannot sell at a loss and continue in business, so those who haven't already been granted price increases by OPA are refusing to produce until such increases are granted. Now the union heads state that if higher prices are granted to the manufacturers.

they will go out for still higher wages .

A high-wage, high-price structure is being created that will eventually crash under its own weight. Unless the people of America come to their senses and put a stop to this ridiculous but tragic business, the outcome may be a national disaster that will make the 1929 depression seem puny by comparison. The crying need of this country is for some statesmen with vision, intelligence, courage, and devotion to their country rather than to themselves. Let us hope that such men will be found before, and not after, the impending catastrophe.

Howard Campbug

May,



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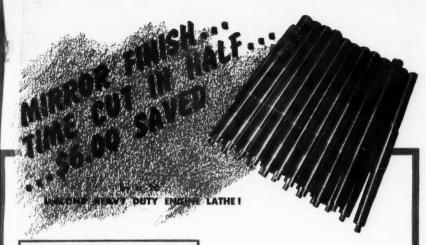
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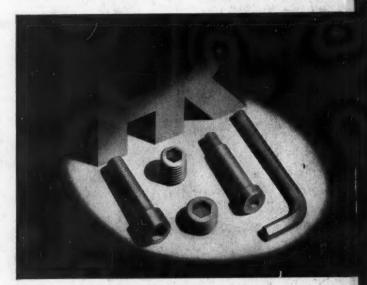


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